PUBLIC HEALTH REPORTS

In this issue

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Who knows the orphan, knows the widow,
Knows the oppression of man over man,
is the orphan's mother?
Nanshe, who cares for the widow,
Who seeks out justice for the poorest,
The queen brings the refugee to her lap,
Finds shelter for the weak.

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frontispiece

Sumerian tablet, circa 1800 B.C., and a translation of the inscription. Courtesy of the University Museum, Philadelphia.

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PUBLIC HEALTH REPORTS

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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PUBLIC HEALTH SERVICE

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Governmental Aspects of Sanitation in the Urban Fringe

FLOYD B. TAYLOR, M.P.H.

THE PUBLIC HEALTH engineer in the State or local health department is in a position to assume leadership in attacking the sanitary engineering problems of metropolitan or urban development. As so many of these problems concern the environment, a field in which he has professional competence, it is natural that he provide guidance and stimulation in obtaining for urban dwellers adequate water supply, sewerage, housing, health department inspection services, and other public health measures.

The public health engineer may be highly proficient in the technical aspects of sanitary engineering. However, in the nonsanitary engineering phases of urban area work, such as planning, economics, and governmental relationships, he is often in need of counsel. At a conference held by the Public Health Service in January 1958, the consensus was that the technical aspects of urban area sanitary engineering were becoming known but that the nontechnical phases, such as governmental relationships and economics, were not well known and needed to be better understood by the worker in this field. It is upon these phases that progress in solving urban area problems hinges.

A case in point is found in the work of the Joint Legislative Committee on Metropolitan Area Study to the Legislature of the State of New York. In their appraisal of metropolitan problems in that State, water supply occupied a prominent place. It was stated that planning, economics, and governmental arrangements were of more consequence than engineering solutions to the problem. They said: "Answers to these problems in a metropolitan area almost invariably entail governmental adjustments and working relations among various political subdivisions which are not in every instance readily achieved. Waterworks engineers have complicated formulas for measuring 'friction loss' in the velocity of water delivered through mains. There is also 'friction loss' in arriving at satisfactory governmental arrangements for water supply and distribution in metropolitan centers" (*1*).

The material which follows on the relationship of government to the urban fringe is intended to aid the public health worker by presenting the fundamentals of governmental relationships. References are given for further study. A question that may well be asked is, what place does a sanitary engineer have in establishing any governmental arrangement or change thereof? The answer is that although he does not usually have a direct role in shaping political circumstances, he may be influential in political decisions and he also may be, and frequently is, instrumental in obtaining the enactment of legislation. He may also be instrumental in obtaining cooperation between separate governmental groups. At the local level the public health engineer can become acquainted with the fundamentals of the governmental arrangement under which he works and the potential use of other arrangements. He can be thoroughly familiar with the purpose and content of various ordinances such as

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those that regulate housing, zoning, and subdivisions. At the State level he should be aware of all permissive and regulatory statutes which in any way affect the provision of sanitary engineering services to the urban area. This is also true of the worker at the Federal level.

Fundamentals

The relationship of government to urban fringe sanitation problems is best viewed in the light of the excellent fundamental concepts of government under which Americans live. These are that government has three functions: legislative, executive, and judicial. These three are closely bound together and interwoven, yet each is an entity.

Legislation is required to establish the legal framework within which urban area problems can be attacked. It is the medium for expressing the will of the people. Legislation is needed at the State level to authorize the use of local forms of urban area government as the State has sovereign power over the municipalities within its borders. Local ordinances are required to permit the adoption of governmental forms.

From the legislative proceedings stem the executive arrangements under which the method of choice or use is administered. These arrangements vary with the form used and will be discussed below.

Court action on contested legislation or executive decisions shape the plans chosen to deal with subsequent problems or in designing a new approach to solving a problem by the means first selected.

It must be recognized that urban fringe sanitation problems are a part of a larger problem of which the solution is primarily political. Hence the importance of understanding governmental functions. This larger problem is that of coordinating the actions of fragmented government—in 1957 there were in the United States more than 102,000 units of government (*2*)—operating in an area of such population density that political boundary lines do not contain the common needs of the people. Besides sanitation requirements there are the common needs of transportation, highways, schools, hospitals, fire and police protection, and storm drainage. Sanitation requirements include water supply, sewage disposal, refuse collection and disposal, and health department inspection services in such categories as milk and food supply and service, radiation, and nuisances.

Governmental Arrangements

In the United States the following governmental arrangements have been used in recent years, singly or in combination, in dealing with urban fringe problems (*3*) : annexation; extension of central city services; transfer of functions; special districts or authorities, single service and multiservice; city-county consolidation; incorporation; and mutual cooperation.

Definitions of these follow, along with a brief, tabulated description of the conditions which are favorable to a particular method. some of its advantages and disadvantages, and some locations where it has been used. The advantages and disadvantages pertain to the method described and are not necessarily considered from an overall standpoint such as the comparison of one method with another.

Annexation

Annexation is the acquiring by a governmental unit of additional territory adjacent to and outside its political boundaries. In practice it means moving a municipal boundary line to encompass more land. Sometimes a pocket of land called an enclave, entirely within a city boundary, but not a part of the city, is annexed (*4*).

CONDITIONS FAVORABLE TO THE METHOD

The area outside the core city should have no incorporated municipalities and must be immediately adjacent to the city boundaries.

ADVANTAGES

Total area subject to city taxes will increase.

Lowers cost of municipal services for annexed areas.

City may receive larger share of State sales and gasoline taxes.

City codes may uplift housing face of surrounding area.

Prevents further fragmentation of government.

DISADVANTAGES

Promotes incorporation of unincorporated areas outside core city.

City may suffer a "net tax loss" if it has to provide

services at existing city rates and at increased cost caused by expansion of equipment and facilities.

Usually inapplicable where urban area crosses a county line and not at all where it crosses a State line.

Annexation laws may be difficult to use.

Seldom takes in the entire fringe so the problem may continue though smaller in area.

SOME PLACES WHERE USED

Mesa, Ariz., Milwaukee, Wis., Fairfax, Va., Alexandria, Va., Dallas, Tex., Kansas City, Mo., Louisville, Ky., Roanoke, Va., Tampa, Fla., Seattle, Wash., Wichita, Kans., Atlanta, Ga., Madison, Wis.

Extension of Central City Services

Extension of central city services refers to the core city's extension, usually through contract agreement with outlying areas or communities, of its water mains, acceptance of incoming sewerlines, or allowing use of its incinerator or sanitary landfill for disposal of refuse.

CONDITIONS FAVORABLE TO THE METHOD

Central city services, especially the waterworks, sewage disposal plant, or incinerator are of adequate capacity.

A definite limit can be set beyond which the city will not be expected to furnish services.

Adequate time for farsighted planning is available.

State statutes do not hinder effectiveness of this form of providing services.

ADVANTAGES

Do not need to build additional plants in outlying areas.

Do not need to set up another administrative and legal structure of government for outlying areas to handle sanitary services.

Urban dwellers avoid capital financing problems.

DISADVANTAGES

Many cities do not have adequate facility capacity for this method.

As existing systems tend to become smaller as they recede from the plant, it may be necessary to construct new water mains and trunk sewers with resultant high cost.

The suburb is completely dependent upon city for services without having a voice in their administration.

SOME PLACES WHERE USED

Grand Rapids, Mich., Auburn, Maine, Peekskill, N.Y., Bloomsburg, Pa., Aurora, Ill., Atlanta, Ga., Fort Worth, Tex., Rochester, Buffalo, and Syracuse, N.Y.

Transfer of Functions

In transfer of functions existing incorporated communities or State legislatures assign the right and responsibility of providing services or functions, such as water supply and sewerage, to another order of government, frequently higher, such as the county. Transfer of functions may also occur laterally, that is from one community to another.

CONDITIONS FAVORABLE TO THE METHOD

A number of incorporated communities which will not consolidate politically.

An efficient functional operation at the level of government to which the transfer is made.

ADVANTAGES

Larger scale operation may produce more efficiency.

Per capita operating costs are lower due to single administration of operation.

County may be kept as a partner in administering functions common to many municipalities.

Community political boundaries remain intact.

DISADVANTAGES

People often fear surrender of any governmental rights from the local level to any other unit of government.

Not easily accomplished where a considerable number of city-type functions are transferred.

SOME PLACES WHERE USED

Dade County, Fla. (also called a federation type), and Los Angeles.

Special Districts

The special district is an independent administrative arrangement endowed with certain specified governmental rights. It may transcend political boundaries, has the power to issue bonds, sometimes to levy taxes, and to contract for construction, but is created for a specific purpose or purposes. It may provide either single or multiple services. It does not have political power of government outside of its specified purpose.

CONDITIONS FAVORABLE TO THE METHOD

Legal debt limits are reached in local communities.

Legal authority is granted by State legislation to establish districts.

Impossible to achieve informal cooperation between existing governments.

ADVANTAGES

May finance operations from revenue bonds.

Circumvents legal debt and tax limits.

Does not change any existing political boundaries.

Can be highly efficient.

Authority bonds may pledge only expected income and not property as security.

DISADVANTAGES

Authority bonds may carry higher interest rates.

Authority may grow to the point where it is nonresponsive to the desires of the people it serves.

Adds another unit of government to existing maze.

When a revenue-producing function is given to an authority, existing governments lose that revenue.

SOME PLACES WHERE USED

North Jersey Water District; Washington Suburban Sanitary Commission (Md.); Allegheny County, Pa.; Sanitary Authority, Louisville-Jefferson County, Ky.; St. Louis, Mo.; Boston Metropolitan District; Passaic Valley Sewage District, Newark, N.J.; Akron Metropolitan Housing Authority, Akron, Ohio; Hampton Roads Sanitation District, Norfolk, Va.; Greater Greenville Sewer District, Greenville, N.C.

City-County Consolidation

The arrangement called city-county consolidation consists of constituting the county or the city as the single administrative, legal center for providing the essential common services and government required by urban dwellers. Neither city nor county completely loses its identity.

CONDITIONS FAVORABLE TO THE METHOD

A large city occupying most of the area of the county.

Equity in the relationship between city and county.

Action required due to expanded functions of both units in the same geographic area.

ADVANTAGES

Substantially eliminates dual governments.

Urban dwellers obtain services under one management.

Regarded by political scientists as one of the best answers to governmental difficulties.

DISADVANTAGES

Difficult to put into effect because of required State legislation.

Suburban dwellers fear they may be absorbed by the central city and fear assumption of added costs.

Not the answer where an urban area of more than one county is involved, also not the ultimate answer as urban areas cross county lines.

SOME PLACES WHERE USED

Philadelphia, Pa.; Boston, Mass.; New Orleans, La.; Baton Rouge, La.; New York, N.Y. (In recent years, only Baton Rouge in 1949.)

Incorporation

Incorporation is the establishment of a political unit of government with geographic boundaries in an unincorporated area, for a closely settled population.

CONDITIONS FAVORABLE TO THE METHOD

An unincorporated area of good size containing population densities of at least 2,200 per square mile.

Economic level of area is high enough to produce the tax base needed to finance the government and its functions.

ADVANTAGES

Resists city annexation.

Retains rights of the individual citizen.

Enables a group of citizens to establish tax basis for funds to provide services they desire.

DISADVANTAGES

Urban dwellers will probably pay higher taxes.

Taxes collected may not be adequate to finance improvements with result that services are ultimately inadequate.

May hinder the overall development of the area.

SOME PLACES WHERE USED

Dallas County, Tex.; Du Page County, Ill.; St. Louis County, Mo. Widely practiced except in the New England States.

Mutual Cooperation

Mutual cooperation is not a form of government. It is the working together of people in existing incorporated places with groups of people in unincorporated areas or with each other, within the existing legal framework, to accomplish the job of providing to all urban dwellers the common services they require.

CONDITIONS FAVORABLE TO THE METHOD

Legal obstacles to other forms.

The prior failure of other forms.

A spirit of cooperation among the people.

ADVANTAGES

Can function within existing legal framework.

No other layer of government is established.

No new taxes are imposed.

Possibly the best of all methods.

DISADVANTAGES

Inherent difficulty of getting groups of citizens to work together.

SOME PLACES WHERE USED

Tulsa, Okla.; Fairfax County, Va.; Metropolitan Area Regional Conference, Washington, D.C.; Salem, Oreg.; Los Angeles, Calif.

There has appeared on the North American continent another form known as federation. So far its use has been only in Toronto, Canada,

and in a modified version it has recently been established in the Montreal area. The Dade County, Fla., venture is sometimes called federation and some times functional transfer, under which it has been listed.

Under this system a new metropolitan government is established which generally has the territorial jurisdiction of the total of that of the lower orders of government. The lower orders of government continue in existence and have control over local functions. This method is related somewhat to functional transfer but with the important difference that many political rights of individual communities are surrendered to the larger government.

CONDITIONS FAVORABLE TO THE METHOD

A muddle of embattled incorporated-unincorporated fringe settlements.

State constitutional authorization can be obtained.

ADVANTAGES

Single control increases efficiency of operation.

Per capita cost of services is lower.

Community boundaries remain intact.

DISADVANTAGES

Some individual community rights are surrendered to a higher order of government.

Because of its vast size, quality of services may deteriorate due to logistical difficulties.

SOME PLACES WHERE USED

Toronto and Montreal.

In choosing, using, or advocating any of these arrangements, careful consideration must be given to three points: there will be resistance to changing any existing governmental pattern; the economics, tax structure, and bond market of any area is a key factor; land use and subdivisions should be carefully regulated.

Legislative

Legislation for the accomplishment of municipal government must be established at the State level and ordinances at the local level. Traditionally, the local government has won increasing autonomy from the State which, however, has never entirely relinquished its control over local governmental arrangements. Thus the establishment of a local governmental form is based upon State statute authorizing this procedure. It is here, therefore, at the State level, that the foundations of the local governmental process are laid. For example, before an authority, annexation procedure, federation, or functional transfer may be established at the local level there must be enabling State legislation. Even the right of contiguous communities to cooperate with each other in providing services is sometimes regulated by State statute.

At the local level, municipal ordinance is invariably required to permit use of any governmental form and to delineate the provisions for administering it. Also State legislation will usually specify or control the administrative or executive procedure used by the local government.

A search was made to determine which States legally sanctioned which types of local governmental forms, and although no central summary was found some generalizations may be made. Many States permit incorporation and annexation under a variety of legal provisions. Among States having legislation authorizing formation of special districts are California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, Oregon, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, and Wisconsin.

Constitutional amendments are usually needed to authorize consolidation, federation, or functional transfer, and exist in only a few States. Extension of central city services by contract with outlying areas is legal in many States.

Auxiliary legislative tools needed in coping with metropolitan problems are subdivision regulations (*5*), zoning ordinances (*6*), building and housing codes, and health regulations. A model subdivision regulation entitled "Suggested Land Subdivision Regulations" was published in 1952 by the U.S. Housing and Home Finance Agency. Forty-three States have enabling legislation authorizing municipalities and many counties to regulate land subdivision.

Examples of State-level legislation enacted to enable the provision of suburban sewers, one

phase of the urban area sanitation problem, have been described by Richards (*7*).

Federal legislation affecting urban area problems exists in the form of certain assistance programs. Also a variety of Federal programs of interest to the urban area worker are outlined in the U.S. Department of Commerce publication, "Federal Activities Helpful to Communities."

Executive

Except for the authority or special district governmental arrangement, the remainder of local forms are administered by traditional methods: commission, council-manager, and mayor-council. The mayor-council form is further described as weak-mayor and council, and strong-mayor and council (*8*).

These forms of administration have jurisdiction over all functions and responsibilities of the local government. Under them departments or divisions may be established to carry on the day-to-day work of providing the city with services. The department heads, of which the health director or commissioner is one, act as staff to the executive.

Commission

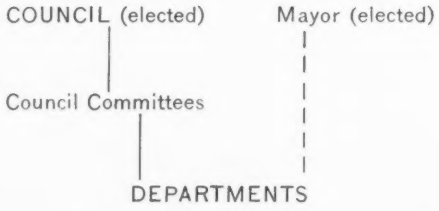
The people elect a commission, each member of which is made responsible for a section of the city governmental functions. The commissioner who received the most votes may be chosen by the commission as mayor. He is frequently made the head of the government and supervises the most important department. The commission may appoint heads of departments to execute their work. An example of the arrangement is shown as follows:

Council-Manager

Under the council-manager form the voters elect a council by popular vote. The council employs a professional municipal administrator or manager as its executive in handling the functions of government. He is an appointed individual who is subject to dismissal by the council, which retains the basic responsibility for proper discharge of the duties of government.

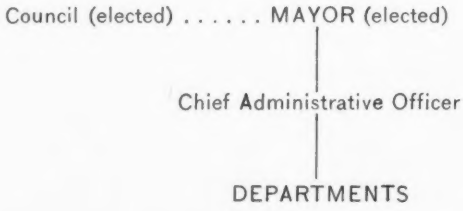
Weak-Mayor and Council

In the weak-mayor and council form the council and the mayor are each elected by the people. However, the mayor acts in an advisory capacity in matters of administration and is the government's political head. The council, sometimes through a series of committees, actually administers the affairs of the municipality. The council committees in turn run the departments.



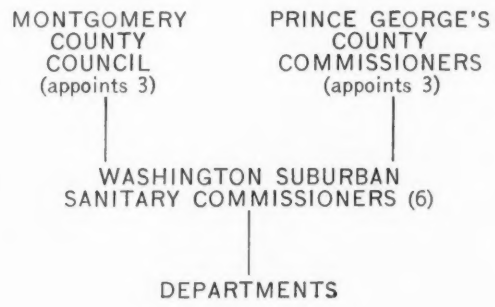
Strong-Mayor and Council

Again, as in the weak-mayor and council, the people elect a mayor and council but under this form of government the mayor has direct charge of operating city functions. He may employ an executive to do the actual work, and a typical arrangement is as follows:



The various weaknesses and strong points of these forms are not discussed in detail as volumes on the subject have been written by political scientists and opinions differ as to their relative merits (*8*).

Under the authority or special district plan, an executive mechanism is established which has only specifically stated governmental jurisdiction (*9*). The administrative responsibility may be single or multiple in coverage. For example, some districts are limited to providing only water supply, and other districts are authorized to administer water, sewerage, and refuse jointly. The governing bodies of special districts or authorities are either elected or appointed. Members of the body, usually odd in number, may be called commissioners, directors, or trustees, and terms of office range from 2 to 6 years. The authority has the power to issue bonds, contract for construction, and collect service charges and sometimes to levy taxes. Dependent upon its size, the authority members may carry out their responsibilities directly, or they may set up a departmentalized administrative structure. An example of the latter is the Washington Suburban Sanitary Commission which has an organizational framework as follows:



Judicial

An extended consideration of the judicial aspects of the governmental problems in the urban fringe is beyond the limits of this discussion. Court decisions on cases pertaining to the subject are vast in number. In any given locality the worker in the field of urban area sanitation should learn the nature of judicial actions bearing upon his work.

One judicial procedure which varies from the usual is that in Virginia (*2*). There, since 1904, all annexation petitions are decided upon by a specially appointed circuit court whose judges are selected by the chief justice of the State supreme court of appeals.

A petition action can be accomplished in various ways. A community which desires to annex land can pass an ordinance citing the need, proposed area for annexation, and the terms. If the people outside a municipality desire to be annexed, a petition may be made by 51 percent of the qualified voters of the area concerned.

Petitions are filed with the county circuit court and a special annexation circuit court is constituted. This court considers a petition on four counts: (*a*) the need of the community for more land in order to develop, (*b*) the need for governmental services in the territory to be annexed, (*c*) the mutuality of interests in the proposed annexed area and the annexing municipality, and (*d*) the financial ability of the annexing community to discharge its obligations to the residents of the area to be annexed. The court has the power to determine the boundaries of the annexed territory as well as the terms and conditions of the annexation settlement.

In making its decision the court often hears testimony from health officials, planners, and public administrators.

The most consistent use of annexation in this country has been in Virginia.

Summary

In summary, the governmental aspects of urban fringe sanitation are among the most important. They arise from the American system of the three foundations of government: legislative, executive, and judicial. The public health engineer, though not usually in a political position, should be thoroughly acquainted with these aspects and how to work through them. He also should be prepared to develop legislative measures which will facilitate his work.

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Signs and Symptoms

An annotated review of medical genetics for 1958, prepared by Dr. Victor McKusick and colleagues, appears in the *Journal of Chronic Diseases*, October 1959. It is planned to repeat the review annually, with a survey of all publications within the calendar year. Dr. McKusick requests that reprints for use in future reviews be addressed to him at the Johns Hopkins Hospital, Baltimore 5, Md.

» «

The rate of admission to general hospitals in this country has increased by almost 80 percent in the last 20 years, from 56 to 99 admissions per 1,000 population, but the average patient in a general hospital today spends 8.6 days there—a decline of about one-third from the 12.5 average of 20 years ago, the Health Information Foundation reports on the basis of studies by the Public Health Service.

» «

In the present American population, chronic illness afflicts 21 million persons over the age of 55, according to estimates of the National Health Survey, Public Health Service. Of this number, nearly one-half are limited in their activity, and at least 1 in 10 is unable to work at ordinary tasks.

» «

A Korean physician, Chai Bin Park, received in June 1959 the first doctorate in public health in the field of biostatistics ever given by the University of California. His topic was "Longitudinal Studies of Tuberculosis Patients Registered in Hawaii." A summary of his doctoral dissertation appeared in the December 1959 issue, p. 1108, of *Public Health Reports.*

Home accident prevention is a public health activity in 40 States, reports the Home Safety Inventory of 1958, sponsored by the National Safety Council. Twenty-four States emphasize home accident prevention as part of established programs, and 16 additional States conduct short-term, specific projects in this field.

» «

Fifty victims of strokes each year will be treated completely within their own homes soon after the onset of attack by the Jewish Chronic Disease Hospital in Brooklyn, which has scheduled a 5-year program. Hospitalization may be required for an acute case, but the goal will be to return the patient home and supply all hospital services there. Rehabilitation therapy will begin at once. By starting treatment shortly after the stroke and the resulting impairment occurs, it is hoped that restoration will be supported and the effects of immobilization will be prevented. The validity of home treatment for other chronic illnesses will be evaluated as well. The project is supported by a grant from the National Institutes of Health, Public Health Service.

» «

A 3-year home care pilot project is underway in a rural area of North Carolina. Increased incidence of aged and chronically ill patients in Person County, covering some 20 square miles in the north central section of the State, stimulated the home care plan which is sponsored by the North Carolina State Board of Health and the Public Health Service. There are 11 practicing physicians in the county and one 60-bed hospital, serving a population of 25,000.

Services now being given to patients in their homes include medical care and consultation, nursing, social service, physical and occupational therapy, health and nutrition education, orthopedic equipment, medicine, and sickroom supplies. Selected residents of all age groups who are chronically ill or disabled are eligible, regardless of financial status, if they possess the potential for self-care and self-support after appropriate restorative services.

» «

The nucleonics industry is debating the Atomic Energy Commission's proposed rule amending its part 20 regulation, "Standards for Protection Against Radiation." The proposed amendment would decrease radiation exposure limits and require new cumulative exposure reports to employees. Complaints state the rule would complicate employee relations, impose unnecessary economic burdens, and seriously discourage industrial use of atomic energy.

Under the proposed changes, total external radiation exposure for any worker over 18 years of age would be limited to an average of 5 rems annually, reduced from 15 rems, with exposure in any one year limited to 12 rems. Maximum permissible concentrations of radioactive substances in air and water would be changed to be consistent with these dose limits. And licensees would be required to give employees a report showing accumulated exposure annually and within 90 days of termination of employment. Employers would also be required to give workers an immediate report of overexposure.

approach to ZERO for Tuberculosis

CONFERENCE REPORT

Poised for a knockout assault on tuberculosis, the Public Health Service and the National Tuberculosis Association last November invited a distinguished panel to advise on use of available resources for accelerating the disease's decline. Meeting at Arden House, Harriman, N.Y., November 29 through December 2, 1959, the consultants listed (p. 105) signaled a dramatic shift in policy and methods of tuberculosis management.

The following statements reflect observations of the views expressed by individual conferees.

The Goal

Tuberculosis can be extinguished as a public health problem. In favored settings, this eventuality is likely relatively soon. The region reaching from Wisconsin to the Pacific Coast already has an average tuberculosis death rate of 4.4 per 100,000, which, compared to a national rate of 40 in 1945, shows how far one large area has come toward eliminating tuberculosis. In a few smaller communities, the disease has all but disappeared. For the Nation as a whole tuberculosis is a continuing threat, but the termination of this threat to public health is a reasonable social goal.

The Means

To reach this goal, what is needed is a common, popular determination and, in each community, a central responsible authority dedicated to the end that all cases of tuberculosis are treated by chemotherapy, either in public facilities or by private physicians, adequately and for sufficient time, in order to remove the public health hazard.

The Time

If the opportunity to end tuberculosis is not seized now, it may be lost indefinitely. Medications that are effective today must be applied broadly before the tubercle bacillus develops resistance to these drugs. Otherwise, in a susceptible population, the disease may rise again to a point which defies control.

The Scope

It is estimated that in 1956 about 800,000 Americans with tuberculosis needed supervision in the public health interest. About half this number were receiving such supervision.

While there is no entire State that can be said

This report was prepared in the Division of Public Health Methods of the Office of the Surgeon General and the Division of Special Health Services of the Bureau of State Services, Public Health Service.

no longer to have a public health problem in tuberculosis, the disease tends to be concentrated more heavily in a few States and in large cities. Within States and cities, it tends to be concentrated in some areas or neighborhoods. Of the race-sex groups, nonwhite males have the highest death rates, but more than half of all tuberculosis deaths (and nearly half of newly reported cases) occur in white males.

The disease is most frequent in the older population, which was generally exposed to the bacillus in years past. At age 50 today, the chances are about even that a person shows evidence of past infection. At age 80, prior infection is very likely a certainty. However, in white Navy recruits, aged 17 to 20, tested in 1958–59, only 1 in 20 had been infected. Although the rate of infection in young cohorts is very much lower than in older cohorts, about 2,600 new cases, not merely infections but cases, are reported annually in children under 5. And 18 percent of all new cases reported are in those under 25. The general trend toward a shift of tuberculosis deaths, cases, and infection into the older age groups appears to be taking place in all areas of the United States, whether tuberculosis rates are low or high.

The direction of tuberculosis control can be improved by information gained from records such as those recommended by the Working Group on Service Programs of the Public Health Conference on Records and Statistics in *Public Health Reports* April 1959, pp. 364–371. A well-kept case register enhances effective casefinding and treatment of patients with active disease.

Present trends indicate that, as the older population passes on, there will be fewer persons with infection, incurred in the past, that can break down into disease as a result of factors like malnutrition and other stresses. As there are fewer cases to spread infection, the number occurring as a result of new infection will grow progressively less, also. Assuming no disaster, depression, famine, or other tragic event reverses the trend, it is possible that tuberculosis will slowly die without increased effort at repression. But such an assumption is dangerous. Especially when means are at hand to deliver the coup de grace, aggressive action seems indicated.

The challenge is to find and disinfect patients with active disease or persons in a vulnerable category, especially those who once had active disease. This would include those who left hospitals against medical advice or whose treatment was otherwise interrupted, as well as selected patients treated prior to advent of chemotherapy. Although the main target is the reservoir of infection in active cases, known and unknown, special attention should be given persons in certain categories who are infected but do not have infectious disease, especially children entering adolescence and those under 4 years of age.

In view of the high probability of extrapulmonary complications from tuberculous infections in infants, effective chemotherapy for those with positive reactions to tuberculin tests should be prescribed without exception. At the same time, research should continue on the effectiveness of drug treatment in preventing tuberculous disease in other persons at special risk.

The Treatment

In the past few years it has become possible to provide effective medical treatment of tuberculosis to outpatients. Combinations of antituberculosis drugs—applied adequately and without interruption—are capable of reversing infectiousness and curing tuberculosis in most patients. The cost of isoniazid in such treatment is about six cents a week, and other drugs used for combined therapy are not exorbitantly expensive.

Prolonged bed rest is not necessarily important in most cases. For the most part surgery is indicated less than in the past, thanks to the effects of chemotherapy.

Drug treatment of tuberculosis, good as it is, is not a simple matter of prescribing pills which are immediately and completely effective. It implies first the selection of an appropriate regimen, usually a combination of two drugs. The medication must be taken without interruption for many months. There must be determination of the patient's infectiousness at regular intervals, as well as of the activity of his disease. Those who do not improve under the prescribed regimen need a change of drugs, or may need hospitalization.

Conference Participants

Dr. Robert J. Anderson, Bertram Black, Dr. Lester Breslow, Dr. Richard M. Burke, Dr. A. W. Dent, Dr. René Dubos, John Egdorf, Kenneth Hamilton, Dr. Herman Hilleboe, Dr. Alexander Langmuir, Mrs. Lucille Petry Leone, Dr. Benjamin D. Paul, Dr. H. McLeod Riggins, Dr. Beryl Roberts, Dr. Joseph L. Robinson, Dr. Joseph B. Stocklen, Dr. William Tucker, and Dr. J. Yerushalmy.

Drug treatment of tuberculosis patients, as it is presently practiced, often falls short of the best that is available. Hospital patients leave against medical advice; patients at home stop taking drugs or fail to appear for medical appointments; long periods pass without assessment of patients' bacteriological or disease activity status. Because of these and other failures, the full potential of chemotherapy is not realized in a great number of cases.

The First Hurdle

The bacillus can be banished from the human environment if infectious cases are found promptly and treated adequately. All new infections are believed to result from fresh, vigorous tubercule bacilli coughed out by an infectious person. Usually infections occur before the case is found for treatment or when treatment is interrupted; the patient under treatment contributes little to the spread of infection.

Remarkably little is understood about the circumstances which favor infection. To illustrate the range of uncertainty, experience on a tuberculosis ward may be compared with the incident of a Christmas party. It is not unusual for a nurse to serve many months on an active tuberculosis ward without becoming positive to the tuberculin test. But an entire roomful of guests at a Christmas party once was found to have been infected in a single evening by one visiting seaman, the only active case in the lot. Research is needed in human factors of susceptibility to infection and in social factors in management of tuberculosis.

Fresh infections can be found and treated promptly with less trouble and expense if research succeeds in developing an inexpensive, simple, and reliable tuberculin test, more satisfactory than those available today.

With present methods of testing and screening, casefinding is likely to be most effective if it is directed to selected populations in terms of the degree of their risk, such as: contacts of active or formerly active patients, adults over 45, especially males, and certain categories known to be vulnerable, especially children under 4, children entering puberty, or persons suffering from malnutrition, or living under congested conditions.

Casefinding as well as treatment and public health supervision of cases may be improved if the medical profession looks into the circumstances of patients whose tuberculosis is first reported on the death certificate. Of all known cases of tuberculosis in the United States, about 1 in 20 is first reported at death. Of all tuberculosis deaths, one in four is first reported as a tuberculosis case at death. About three-fourths of the cases reported are in a moderately advanced or far advanced stage.

Vaccination

Use of BCG, the only available vaccine, as indicated by recommendations of an advisory committee to the Public Health Service in 1957 and the American Trudeau Society in 1958, should be limited in the United States to certain highly exposed populations. Standards are needed for evaluating the activity of vaccines.

Strategy

Effective treatment of patients with infectious tuberculosis is the basis of plans to prevent new infections. Programs may proceed in several phases simultaneously, according to the prevalence of infection in defined neighborhoods or sections. Attention to the geographic strongholds of tuberculosis needs to have priority over campaigns of mass screening where incidence is relatively low. After the incidence of the disease is generally reduced, and if results of studies now in progress so indicate, attention may shift from therapy of diseased patients and investigation of suspect populations to the process of screening for positive reactors to be treated.

Ultimately, a single control officer may suffice for management of tuberculosis in large regions where infections are derived only from exotic sources.

Meanwhile, special funds should be allocated from central sources to concentrate the attack where infections are most common. Resources of personnel and facilities also should be subject to more central control.

The Personnel

The main burden of adequate treatment seems likely to be carried increasingly by the general practitioner in private practice, with help from the public health nurse and in some instances the medical social caseworker.

Because of the effectiveness of chemotherapy, treatment of tuberculosis more and more is managed by the general practitioner. Special instruction, consultation, and assistance by public health agencies can help private physicians to provide satisfactory treatment to tuberculosis patients. Additional services will help the patients and their families obtain assistance, as required, of the full battery of public and voluntary agencies. Such a unified program of treatment and services for all tuberculosis patients will require that physicians report without exception the cases under their care.

Cooperation of patients with treatment, especially if they remain at home under supervision, depends on attention given to their basic needs: food and shelter for the family, money for drugs and other expenses related to illness, suitable employment when they are ready, and ordinary friendliness. Remarkable cooperation has been won from patients simply by a demonstration that someone cared about them and felt it was important that they went through with the program of therapy planned for them.

In some communities, well-trained medical social workers are available to see that patients and their families receive appropriate services. In most communities, the public health nurse has to see that the patients receive all available medical and social services they need without regard for lines of jurisdiction. In this task, the nurse is most likely to succeed if a single authority is responsible for assuring the availability and adequacy of all services to tuberculous patients, or if heads of independent agencies in the community at least meet regularly to exchange information and assistance.

Leadership

Criteria of performance and achievement, district by district, and State by State, and for the Nation as a whole, will expedite the victory at every stage. Public, voluntary, and professional bodies have the opportunity to establish such criteria for casefinding, diagnosis, reporting, treatment, rehabilitation, and surveillance. How much initiative will be taken in States and local communities toward setting criteria will depend to a great extent on the attitudes of the Association of State and Territorial Health Officers, the American Trudeau Society, and other professional bodies toward such local action.

It is largely their counsel which will determine whether communities will supply needed drugs and medical services, adequate diet, and homemaker services for tuberculosis patients. They can assure that adequate laboratory services will be available to all physicians.

Their leadership will determine whether political and social action will provide means for the integration of services and continuity of care for the tuberculous patient.

With effective leadership, it is possible that a program for eliminating tuberculosis as a public health problem in the United States can be brought far toward completion within the foreseeable future.

U.S. Army scientists investigate State regulations and processes of cleaning raw feathers for use in bedding and offer a practical disinfecting procedure.

Disinfection of Raw Feathers for Bedding Material

MORRIS R. ROGERS, M.A., ARTHUR M. KAPLAN, Ph.D., and GEORGE COHEN, B.S.

LARGE QUANTITIES of land and waterfowl feathers are used annually by the Armed Forces as filling materials in pillows and sleeping bags. Prior to use in these bedding items, the feather filling materials are simply "well cleaned, washed, and dried" according to military specifications (*1–4*). Although no exact procedure for cleaning, washing, and drying the feathers is outlined in these specifications, it is presumed that the feathers purchased over the past years were processed in accordance with the bedding laws of the State in which the feathers were purchased or in some instances according to the requirements set forth by the contracting officer purchasing the feathers for the Armed Forces. These procedures were apparently adequate to permit passing the feathers for cleanliness as required under these specifications. The cleanliness test consisted of determining the oxidizable matter (oxygen number) and solvent soluble matter, excluding DDT from the latter value.

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Forty-two States and the District of Columbia have enacted bedding laws which require, in addition to the cleaning, washing, and drying procedures, that all used bedding, and in many instances new bedding materials, must undergo some process to insure inactivation of all disease-bearing spores or disease-breeding germs, and removal of all filth, vermin, and extraneous organic matter. The final product is presumably clean and sanitary, but not necessarily sterile.

Various State regulations governing the sterilization of new down and feathers require the use of either dry-heat, hot water, flowing steam, steam under pressure, or fumigation. Answers to an inquiry addressed to three large eastern States indicated that very little research has actually been done on the sterilization of feathers. Similarly, little information has been published on the commercial sterilization of bedding materials by heat (*5*). The time-temperature relationships for the heat sterilization of feathers, incorporated into many State bedding laws, appear to be adaptations of the procedures used to sterilize mattresses and other bedding, with lower holding times specified in certain instances. A number of workers in the field have indicated that new feathers will be sterilized by current commercial processing. Data to support this view,

however, have not been available. Consequently, there appears to be little technical basis for the sterilization requirements of many State regulations.

Three diseases, salmonellosis, psittacosis, and histoplasmosis, transmitted to man from fowl, might be spread through the agency of feathers. *Salmonella* organisms of the types associated with salmonellosis in humans have been found in duck, hen, turkey, goose, and pigeon eggs (*6–13*). *Histoplasma capsulatum*, the causative organism of histoplasmosis, has been found in domestic fowl, soil, sawdust, and manure (*14–17*). Psittacosis has been reported in parrots, parakeets, lovebirds, canaries, chickens, turkeys, and pheasants, and the psittacosis virus has been isolated in garden soil (*18–20*).

It is most important to note that the literature does not establish any significant epidemiological or laboratory evidence that these diseases in humans are due to either exposure to or the handling of contaminated feathers.

However, since the organisms causing salmonellosis, psittacosis, and histoplasmosis in humans might be associated with feathers, the need for requiring sterilization of feathers procured for the Armed Forces has come under investigation. Although State bedding regulations use the term "sterilization," which can be interpreted as meaning disinfection, this is misleading since most feather processors do not actually sterilize feathers. Compliance would require the destruction of every form of life, be it plant or animal, visible or invisible under the microscope, harmful, or innocuous (*21*).

To avoid confusion over the use of the term "sterilization" in State bedding regulations, the position has been taken here that the sterilization requirement is not intended to insure sterile feathers in the finished article of bedding material but rather to insure the destruction of pathogenic contaminants of new feathers. If the word "sterilization" were taken literally, many feather processors would have to install new or modified equipment to meet the sterilization requirements stipulated in most State bedding regulations.

In the absence of experimental data, the purpose of this study was to determine the effectiveness of the washing, souring, and heat-drying operations in freeing feathers of potentially hazardous micro-organisms, using laboratory, pilot plant, and commercial facilities. In addition, the effectiveness of a chemical procedure for disinfecting was investigated.

Methods

Washing and disinfecting procedures for raw feathers were tested and evaluated in the laboratory and, on a larger scale, in a pilot plant and a commercial feather processing plant.

Laboratory Studies

A general washing procedure (*22*) which closely resembles the procedure used in commercial feather processing plants was first evaluated in the laboratory to determine its bactericidal and fungicidal capacity. Sterile domestic white duck feathers obtained from a commercial source and inoculated with the test organism were used in the first series of tests. The feathers were first autoclaved for 30 minutes at 18 pounds pressure and then tested for sterility by plating a sample of the feathers in nutrient agar (Difco).

Escherichia coli, ATCC No. 26, and *Aspergillus niger*, QMC No. 458, were employed as test organisms. *E. coli* was grown in nutrient broth (Difco) at 37° C. for 18 hours and *A. niger* was grown at 30° C. on Sabouraud dextrose agar (Difco) for 6 to 7 days.

Three hundred and sixty-three grams, wet weight, of the sterile feathers were placed aseptically in a laboratory tumble jar and tumbled at 27 revolutions per minute with 1 gallon of water heated to 85° F. The sterile feathers were inoculated with 150 ml. of the broth culture of *E. coli* or 100 ml. of the pooled washings of two agar slants of *A. niger*. The jar was tumbled for 1 minute to permit thorough distribution of the tracer organism throughout the feathers. A 1-ml. aliquot of the inoculated feathers was removed aseptically from the tumble jar with sterile tweezers. The sample of feathers was allowed to drain free of excess water after expelling as much of the water as possible with tweezers. The 1 gram of inoculated feathers was transferred to a Waring Blendor and blended with 99 ml. of sterile water for 1 minute. A 1-ml. aliquot of the inoculated feathers suspension was then re-

moved and plated in nutrient agar or Sabouraud dextrose agar to obtain an organism count. Triplicate samples were tested which represented the controls used in these studies.

Fourteen grams of a trisodium phosphate blood solubilizer compound were added to the tumble jar and tumbled for 15 minutes. This was the end of the first wash cycle. One gram of the washed feathers was transferred aseptically to a Waring Blendor, macerated with 99 ml. of sterile water for 1 minute and plated in the applicable agar.

In the second washing cycle, the drained feathers were washed in 1 gallon of water at 85° F. containing 0.5 ounce of liquid nonionic detergent. The feathers were tumbled for 2 minutes, allowed to soak for 13 minutes with no tumbling, and drained. Bacterial counts on the feathers were taken in the usual manner.

The third and final cycle in the washing operation consisted of adding to the tumble jar 1 gallon of water at approximately 60° F., 22.4 grams of sodium silico fluoride, and 1,865 ppm of a general purpose disinfectant (*23,24*) having the following composition: 20 percent sodium-o-phenylphenolate, 40 percent sodium 4-chloro-2-phenylphenolate, 13 percent sodium 6-chloro-2-phenylphenolate, 14–18 percent moisture, with the remainder consisting of other isomeric phenolic compounds. The final pH was between 4 and 5, and water hardness ranged between 68 and 85 ppm as calcium carbonate. The feathers were tumbled for 15 minutes and soaked for 30 minutes in this solution. One gram of feathers was transferred to a Waring Blendor with 99 ml. of water and bacterial counts determined as previously described.

It was found in this and other unpublished studies that the need for incorporating a sorbitan monoöleate-lecithin in the agar was not required because of the small carryover of disinfectant in the dilutions used, coupled with the inactivating capacity of the peptone in the nutrient agar.

Tests were also made to determine the ability of the normal washing procedure combined with the use of the general purpose disinfectant, as previously described, to reduce or destroy the natural flora found on raw feathers. The feathers used had not been autoclaved or inoculated with any organism prior to washing. Smears were made from representative survivor colonies which appeared on the agar plates using a simple alcoholic methylene blue stain.

Pilot Plant Studies

The washing and disinfecting procedure for feathers described in the laboratory studies was repeated on a larger scale in a pilot plant located in the U.S Army Textile, Clothing, and Footwear Division at the Quartermaster Research and Engineering Command (*22*).

The procedure and water sources were essentially the same as in the laboratory runs except for the amounts of materials used in the tests. Six pounds of feathers from the same lot were placed in a washer which contained 35 gallons of water at 85° F. and 3.5 ounces of a trisodium phosphate blood solubilizer compound. The feathers were agitated for 15 minutes and then drained completely. The cycle was repeated using 35 gallons of water at 85° F. and 3.5 ounces of liquid nonionic detergent.

In a third cycle, the washer was refilled with 35 gallons of tapwater at approximately 60° F. to which 3.5 ounces of sodium silico fluoride sour and 9 ounces of general purpose disinfectant (1,865 ppm) were added with a final pH reaching about 5. The feathers were held in this solution for 45 minutes, rinsed twice with warm water at 85° F., and drained. Bacteria counts were made on the feathers after each washing cycle. The results are reported in the table.

Commercial Studies

The washing and disinfecting process was also evaluated on a large scale using the equipment in a commercial feather processing plant. The washer, similar to the pilot plant washer (*22*), except for capacity and materials of construction, was made of cast iron and consisted of a large drum 8 feet long and 4½ feet in diameter with rotating paddles mounted on a central shaft. It had a capacity of 125 pounds of dry feathers.

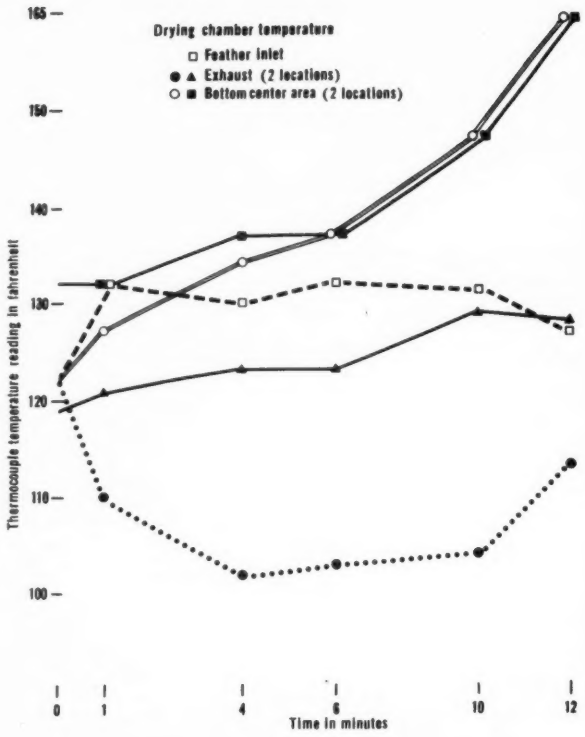
In the plant procedure, 125 pounds of raw white Long Island duckling feathers were dumped into a large washer containing approximately 500 gallons of water warmed to approximately 100° F. Sufficient liquid nonionic

detergent, or ½ bucket, about 3 pounds, plus a scoop, or about 3 pounds, of alkali, and 1 cup, or about 1 pound, of sour, were put into the washer. No attempt was made to use exact amounts of alkali, detergent, or sour, since we desired to have the feathers washed with the normal variations expected under commercial processing conditions. The feathers were washed for 10 minutes and the washer drained. The feathers were then rinsed twice with water at approximately 93° F. for 20 minutes, fed into a centrifugal extractor to remove most of the water, and placed in a steam-jacketed dryer for 10 to 15 minutes.

The dryer is essentially a steam-jacketed cylinder with a series of rotating arms mounted on a shaft running along the axis of the cylinder. As the feathers begin to dry, they become airborne due to the action of the rotating paddles. The feathers are fed into the dryer cylinder through a sliding door at one end and removed by suction through a duct at the other end. During the drying operation, air is continuously removed through an exhaust duct at the top of the dryer. It usually takes about 15 minutes to dry a 50- to 60-pound lot of feathers.

Samples were taken at the feather inlet during the drying cycle. Information on the airflow in cubic feet per minute through the dryer was not available. Temperatures were determined in the dryer by means of thermocouples placed at the feather inlet and outlet, the air exhaust, and near the bottom center of the dryer. Readings were taken at the beginning and at 1- to 4-minute intervals throughout the drying cycle. Representative temperature data are plotted on the chart. No temperature data is available from the thermocouple placed at the feather outlet since it was accidentally broken during the drying cycle. The bacteria and fungus counts on the raw feathers were also obtained before processing.

The procedure and conditions using the general purpose disinfectant were the same as previously described except that 8 pounds of the disinfectant, equal to 1,902 ppm in solution, were added to the feathers after the second rinse cycle and the feathers left in this solution for 45 minutes. Plate counts of organisms were obtained after 20- and 45-minute exposures to the disinfectant (see table).



Temperature variations in drying chamber at a commercial plant

All tests were performed within the plant where the air was dusty and filled with floating feather down. It was very difficult to prevent contamination under such conditions, especially during the sampling and plating procedures. These conditions could well account for the higher total bacteria and coliform counts obtained under commercial conditions in comparison to the laboratory tests.

Results

Results of the washing and disinfecting processes of feathers after each treatment cycle in the laboratory are reported in the table. The natural bacteria found on the feathers appear to be readily removed or destroyed by the three washing cycles, with the exception of the spore-forming bacilli. This is further substantiated by the nearly 100 percent kill obtained when sterile feathers were inoculated with *E. coli* and *A. niger*, used as tracer organisms. The nonpathogenic spore-forming surviving organism was identified as *Bacillus subtilis* by Dr. Ruth E. Gordon, Rutgers University, New Brunswick, N.J.

Four tests were conducted in the pilot plant. Organism counts were obtained only after the feathers had been washed and immersed for 45 minutes in a solution containing 1,865 ppm of the general purpose disinfectant. Although the percent kill (see table) in these tests was not as high as that obtained in the laboratory tests, all the nonsporulating organisms present on the feathers were completely killed.

A direct comparison cannot be made between the laboratory tests, and pilot plant and commercial runs, since the larger scale tests combined essentially three different wash cycles into one operation. Also, specialized media were used in an attempt to give a clearer picture of the types and numbers of organisms that survived during the washing, disinfecting, and drying procedures.

Percent kill of natural flora and inoculated organisms on feathers after washing and after disinfection with general purpose disinfectant under laboratory, pilot plant, and commercial conditions

Test runs [1]	Natural flora		*Escherichia coli* added		*Aspergillus niger* added	
	Percent kill	Counts per gram of feathers	Percent kill	Counts per gram of feathers	Percent kill	Counts per gram of feathers
Laboratory						
Control	-------	5.0×10^{4}	-------	3.49×10^{5}	-------	9.0×10^{6}
After first washing cycle	86.0	7.0×10^{3}	99.14	2.98×10^{3}	99.92	7.0×10^{3}
After second washing cycle	94.0	3.0×10^{3}	99.85	5.2×10^{2}	99.94	5.0×10^{3}
After third washing cycle and soaking in 1,865 ppm disinfectant for 45 minutes	98.8	6.0×10^{2}	99.99	1.0×10^{1}	100.0	0
Pilot plant						
Control	-------	6.4×10^{4}	-------	-------	-------	
After third washing cycle and soaking in 1,865 ppm disinfectant for 45 minutes	82.81–92.19	11.0×10^{3}—5.0×10^{3}	-------	-------	-------	
	Total flora [2]		Coliforms [3]		Molds [4]	
	Percent kill	Counts per gram of feathers	Percent kill	Counts per gram of feathers	Percent kill	Counts per gram of feathers
Commercial plant						
No disinfectant added:						
Control	-------	3.0×10^{5}	-------	4.0×10^{5}	-------	26.0×10^{4}
After washing, rinsing, and extracting	33.3	2.0×10^{5}	80.0	8.0×10^{3}	72.0	72.8×10^{3}
After drying	64.0	10.8×10^{4}	99.4	2.4×10^{3}	100.0	0
1,902 ppm disinfectant added:						
Control	-------	4×10^{5}	-------	5×10^{5}	-------	26.0×10^{4}
After washing, rinsing, and soaking for 20 minutes	99.16	3.36×10^{3}	99.2	4.0×10^{3}	100.0	0
After washing, rinsing, and soaking for 45 minutes	99.67	1.32×10^{2}	98.4	8.0×10^{3}	100.0	0
After drying	(5)	(5)	99.4	3.0×10^{3}	100.0	0

[1] Laboratory and pilot plant tests made with domestic white duck feathers; commercial plant run used Long Island duckling feathers. Surviving organisms after laboratory and pilot plant runs were spore-forming bacilli.
[2] Tryptone glucose extract agar.
[3] Eosin methylene blue agar.
[4] Cooke's rose bengal agar.
[5] Spreader on plates made it impossible to count.

Normal commercial washing and drying procedures reduced the total count of organisms by 64 percent, coliforms by 99.4 percent, and molds, 100 percent. The addition of 1,902 ppm of the general purpose disinfectant destroyed more than 99 percent of the nonsporulating bacteria and molds, with the exception of the 98.40 percent kill of coliforms after the 45-minute soaking. We believe this reduction in percent kill resulted from contamination of the plates by polluted air. As previously stated, the air was very dusty, making it difficult to maintain aseptic techniques.

Counts were not obtained of the total number of organisms after drying due to the presence of spreaders on the agar plates. Coliform and mold counts, however, were possible since the selective media used inhibited spreaders.

Data illustrated on the chart show considerable temperature variation within the chamber where the washed and disinfected feathers were dried. It should be mentioned that feathers are not static during the drying operation and that the temperature varied within the chamber between 113° F. and 165° F. at the end of the drying cycle. This means the feathers were going through a continuous heating and cooling cycle as they moved about in the dryer.

No obvious effects were found in the feathers after immersion in the general purpose disinfectant for 45 minutes and then drying. This was confirmed by the results of filling capacity and oxygen number determinations.

Discussion

The necessity for destroying the disease-producing organisms that might be found on feathers, such as *Salmonella*, *Histoplasma capsulatum*, and the psittacosis virus, can be considered a desirable public health requirement even though feathers have not been established as vectors of disease to the best of our knowledge. However, to require the destruction of nondisease producing organisms on raw feathers or to enforce sterilization prior to their use in bedding materials would appear to be costly, wasteful, and an exorbitant demand upon the commercial feather processors. Instead of enforcing sterilization, it would be much more realistic to require a pasteurization or disinfection procedure which would kill all the pathogens.

Other workers (*7*,*25*) have shown that *Salmonella* is readily destroyed at 132° F. for 20 minutes and *H. capsulatum* at 131° F. for 15 minutes. Although no data are available on heat destruction of the psittacosis virus, other pathogenic viruses are inactivated at relatively low temperatures. For example, St. Louis and Japanese B-type encephalitis viruses are inactivated at 133° F. in 30 minutes, and the Russian Far East encephalitis virus is inactivated at 140° F. in 10 minutes. Types A and B influenza virus are killed by heat at 132° F. in 20 to 30 minutes. The variola or smallpox and yellow fever viruses are inactivated in 10 minutes by moist heat above 140° F. (*25*).

From the results of this study and the information available in the literature on the effect of heat on the destruction of the pathogenic organisms suspected to be associated with feathers, a specification requiring the three-cycle washing described in the laboratory test procedure followed by exposure of the feathers to 160° F. heat for 5 minutes, should adequately safeguard the public from a possible health hazard from feathers used in bedding materials.

An alternative disinfecting procedure to the heat treatment process is to immerse the feathers in a disinfecting bath solution such as the general purpose disinfectant. Previous studies sponsored by the Quartermaster Corps (*23*, *24*) indicated that the general purpose disinfectant has a phenol coefficient of 71, which means that it is 71 times more effective in killing *Salmonella typhosa* than a 5 percent phenol solution. It is known (*25*) that 5 percent phenol will destroy *S. typhosa* in 5 minutes. The ability of the general purpose disinfectant to destroy this organism is therefore apparent. No data on the ability of the general purpose disinfectant to destroy *H. capsulatum* and the psittacosis virus is currently available. Stedman and associates (*26*) evaluated a mixture of 4-chloro-2-phenylphenolate, 6-chloro-2-phenylphenolate, and anhydrous potassium castor soap against *Trichophyton interdigitale* on inanimate surfaces and found a 99.0 percent reduction of the organism in 10 minutes. The mixture of 4-chloro-2-phenylphenolate and 6-chloro-2-phenylphenol-

ate has a reported phenol coefficient of 97 and further substantiates the fungicidal capacity of the general purpose disinfectant since it contains more than 50 percent of the sodium salts of these isomers. We have shown that a 100 percent reduction of mold spores has been obtained after 20 minutes soaking in the general purpose disinfectant.

It would appear, therefore, that the general purpose disinfectant has a powerful fungicidal capacity as well as germicidal efficiency. The only published virucidal data available on the action of phenolic disinfectants similar in composition to the general purpose disinfectant is a report on the virus of Newcastle disease, avian pneumoencephalitis (*27*). This report showed that sodium-o-phenylphenolate with a phenol coefficient of 8, at 1.0 percent concentration, destroyed the virus in 5 minutes. Since the general purpose disinfectant has a phenol coefficient of 71, it is a more potent fungicide and virucide than sodium-o-phenylphenolate but a weaker fungicide and virucide than the mixture of 4-chloro-2-phenylphenolate and 6-chloro-2-phenylphenolate. However, soaking the feathers in 2,000 ppm of the general purpose disinfectant solution for 20 minutes should allow adequate time to reduce the pathogenic organisms to a safe level. This conclusion is based on the assumption that the fungus and virus susceptibility to the disinfectant does not vary greatly from species to species within each classification.

Summary

A study of regulations in 42 States and the District of Columbia governing the sterilization of feathers revealed great variety. Little or no technical data are available to substantiate some of the sterilization requirements, especially those pertaining to the sterilization of feathers by heat. Some requirements had little or no public health significance, others contained impractical or unnecessary provisions and still others differed markedly with respect to the same item of sanitation. The present investigation was undertaken to elucidate some of the problems confronting the U.S. Army in preparing specifications to assure that feathers purchased for use in bedding materials would be acceptable by sanitation standards. A practical washing, heat-treating, and chemical disinfecting procedure for processing new feathers is described.

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Training in Epidemiology

A course in applied epidemiology will be offered at the Communicable Disease Center, Public Health Service, Atlanta, Ga., May 9–13, 1960.

Designed primarily for physicians who serve as investigators of disease outbreaks or have administrative responsibility for such investigations, the course serves both as a refresher course for the experienced health administrators and as an introductory course for physicians new to public health. Emphasis is on developing an understanding of how epidemiological techniques can be used in the approach to the solutions of problems in the preventable disease field. Lecture-discussion sessions and audiovisual aids are used in the presentations, and there is much group participation which is obtained through the utilization of the group solution of epidemiological problems, seminar-type presentations, and panel discussions. Registrants will be expected to attend all sessions of the course.

Further information and application forms may be obtained from the Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga., Attention: Chief, Training Branch.

Blood Sugar and Syphilis Serology Using a Single Specimen

JACK J. JOLLY, B.S., WILLIAM V. WHITE, B.A., JOSEPH PORTNOY, Ph.D., and JOSEPHINE W. GUTRIDGE, R.N.

SCREENING TESTS for diabetes and syphilis may be performed on a single blood specimen collected in a tube containing sodium fluoride, according to results obtained in recent studies.

Since the development of the Wilkerson-Heftmann method (*1*) using the Hewson Clinitron for the rapid examination of blood specimens for determination of sugar content, many health departments have used this testing method in mass diabetes screening programs. A number of health departments have combined diabetes screening with mass syphilis screening programs. The development of techniques for obtaining specimens for both diabetes and syphilis tests from a single venipuncture made the combination of the two screening programs economical and acceptable.

The most commonly used technique was reported by the District of Columbia Department of Public Health, and has been called the "piggyback" method (*2*). In this technique, a plain Sheppard tube is used to collect the specimen for serology; the needle of a second Sheppard tube containing sodium fluoride is then inserted into the rubber sleeve of the first tube to collect the specimen for sugar determination. The sodium fluoride prevents coagulation and preserves the glucose level for approximately 72 hours without refrigeration (*3*).

The Venereal Disease Research Laboratory (VDRL) slide test (*4*) was generally preferred for the serologic examination, and the Wilkerson-Heftmann method was used for sugar determination.

While the "piggyback" method was acknowledged to be more economical than previously used techniques, involving two venipunctures or drawing blood into a syringe and inserting the prescribed amounts into two test tubes, it still slowed up the collection of specimens for serologic screening and added to the cost of the screening program in personnel time and equipment. In addition, there was the traumatic effect on the screenee of seeing the second specimen drawn.

In early 1957, the rapid plasma reagin (RPR) test for syphilis was developed by Portnoy, Garson, and Smith (*5*). During the same year, its acceptability for use as a rapid, practical, and economical screening test for syphilis was demonstrated by the Venereal Disease Branch, Communicable Disease Center, Public Health Service (*6*). More than 47,000 Mexican farmworkers, entering the United States through the border reception center, El Centro, Calif., were tested with the RPR test.

In the RPR test, the authors (*5*) utilized potassium oxalate, heparin, or potassium sequestrene as an anticoagulant. In diabetes screening programs, sodium fluoride in the approximate ratio of 10 mg. per cubic centimeter of blood has been a satisfactory anticoagulant and

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Table 1. Comparative results of the RPR, VDRL, and TPCF tests, Chapel Hill data

Test	Number specimens	Reactive	Non-reactive	Diagnosed cases of syphilis			Sensitivity	Specificity
				Reactive	Non-reactive	Total		
RPR [1]	97	48	49	47	2	49	96	98
VDRL [2]	97	42	55	41	8	49	84	98
TPCF [2]	97	45	52	45	4	49	92	100

[1] On sodium fluoride specimen. [2] On conventional blood specimen.

NOTE: $\text{Sensitivity} = \frac{\text{Reactors to test, confirmed as syphilitic} \times 100}{\text{Total diagnosed as syphilitic}}$

$\text{Specificity} = \frac{\text{Nonreactors to test, confirmed as nonsyphilitic} \times 100}{\text{Total diagnosed as nonsyphilitic}}$

glucose preservative when testing is not done immediately after collecting the specimens.

In studying the need for developing practical, economical, and rapid screening programs, it became apparent that the use of a single anticoagulant and preservative for both tests would simplify the collection of specimens and minimize the cost of conducting two screening programs.

Study 1

The Venereal Disease Experimental Laboratory, Chapel Hill, N.C., cooperated in a small pilot study to determine the feasibility of using sodium fluoride as an anticoagulant for the RPR test.

Ninety-seven sets of blood specimens were collected in a venereal disease prevention and control center, approximately half from diagnosed syphilitic patients, and half from undiagnosed screenees. The "piggyback" method was used, one Sheppard tube containing sodium fluoride, and the other containing no preservative. The following day in the experimental laboratory, the RPR test was performed on the specimens containing sodium fluoride, and the VDRL slide test and the *Treponema pallidum* complement fixation (TPCF) test (*7*) were performed on the conventional blood specimens. The results of the study are shown in table 1. The diagnosis of syphilis was established or ruled out for every patient by means of a clinical diagnostic workup.

The results of study 1 indicated that the sodium fluoride tube yielded an acceptable specimen for the RPR test, making it possible to do combined syphilis and diabetes testing on a single specimen. In order to confirm the findings of this small study, results of the RPR and VDRL tests were compared on a larger volume of specimens under more typical field conditions.

Study 2

The Virginia Department of Health and the Richmond City Health Department participated in a study using specimens of blood obtained from the city jail population during April, May, and June 1958.

Table 2. Comparative results of RPR and VDRL tests, Richmond data

Test	Number specimens	Reactive	Number reactors diagnosed as syphilitic	Relative sensitivity	Relative specificity
RPR [1]	1,317	156	140	98	99
VDRL [2]	1,317	107	100	70	99

[1] On sodium fluoride specimen. [2] On conventional blood specimen.

Using the "piggyback" method, specimens were drawn into two Sheppard tubes, one of which had been prepacked with approximately 30 mg. of sodium fluoride. The conventional specimen was drawn into the plain tube, after which approximately 3 cc. of blood were drawn into the sodium fluoride tube. Specimens were examined in the laboratory of the Virginia Department of Health. The VDRL slide test was performed on the clotted specimens, and both RPR and sugar determination tests were performed on the sodium fluoride specimens.

Specimens from a total of 1,334 persons were tested by the VDRL and RPR methods. Of these, 1,157 were nonreactive to both tests and 177 were reactive to one or both tests.

Of the 177 persons with reactive test results, 143 were confirmed as having syphilis by a clinical diagnostic workup, and 17 were diagnosed as nonsyphilitic. The remaining reactors were lost to followup and therefore no definitive diagnoses are available for these individuals (11 were reactive to both tests and 6 were reactive to the RPR test only). These persons are excluded from the final computations. Comparative results on the remaining 1,317 specimens are presented in table 2. Diagnostic workups were not done on the nonreactors and since definitive diagnoses are unavailable for this group, the terms "relative" sensitivity and "relative" specificity are used.

The results of the Richmond trial tended to confirm the findings of study 1. The results indicated that the RPR test on sodium fluoride blood specimens was a more sensitive screening technique than the VDRL slide test on blood specimens collected in the usual manner.

Field Trial

Following the satisfactory results of the two controlled studies, the new method of collecting blood in the District of Columbia's diabetes and syphilis screening programs was used to replace the "piggyback" technique.

During June, July, August, and the early part of September 1958, 22,965 blood specimens were drawn, using the single prepacked sodium fluoride Sheppard tube. Specimens were tested in the District of Columbia Health Department laboratory for sugar content and serologic reaction. The use of this technique proved highly successful.

It has been estimated that the reduction in the number of Sheppard tubes used and the saving of clerical and technicians' time amounted to a financial saving of at least $7,092.65 for the collecting, processing, and reporting of the 22,965 specimens.

	Savings
Tubes	$2,066.85
2 (GS–2) clerks	2,170.00
Technicians' time	2,755.80
Miscellaneous	100.00
Total	$7,092.65

The D.C. Health Department laboratory reported the frequent occurrence of hemolysis. Apparently, however, this has not affected the accuracy of the results of the RPR test. Hemolysis can be reduced by gentle agitation of the tubes, and by running the RPR test as soon as possible after collecting the specimen. Extremes in temperature should be avoided and refrigeration should not be used unless specimens are to be kept more than 48 hours before testing.

Summary

Two studies were made to determine the feasibility of using sodium fluoride as an anticoagulant in blood specimens collected for the rapid plasma reagin screening test for syphilis.

Study 1 consisted of testing two specimens each for 97 individuals. One specimen, without preservative, received the VDRL and TPCF tests; the second specimen, containing sodium fluoride, received the RPR test. The sensitivity rates for the three tests were: RPR, 96 percent; VDRL, 84 percent; and TPCF, 92 percent. The RPR and VDRL tests showed a specificity of 98 percent, and TPCF tests showed a specificity of 100 percent.

Study 2 compared results of VDRL and RPR tests on 1,317 sets of specimens (VDRL, conventional specimen; RPR, sodium fluoride specimen). The relative sensitivity of the RPR test was 98 percent, the VDRL, 70 percent. The relative specificity of the RPR test was 99 percent, the VDRL, 99 percent.

In the field trial, the District of Columbia

Health Department initiated the use of the study technique (June 1958) and reported a financial saving of at least $7,092.65 on the collecting, processing, and reporting of the first 22,965 specimens.

The use of this technique not only simplified the collecting and handling of specimens, but it also eliminated approximately half of the clerical work; and because of the speed and ease with which the specimen was collected, minimized the traumatic effect on the screenee.

The results of these studies indicate that the sodium fluoride tube yields an acceptable specimen for the RPR test, thereby making it possible to combine syphilis and diabetes screening programs using a single blood specimen for both tests.

The method is recommended as acceptable, practical, and economical for use wherever it is desirable to do syphilis and diabetes screening on the same population group.

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Milwaukee's Fluoridation Reduces Caries

A dental examination of 4,660 school children conducted by the Milwaukee Health Department following 6 years of fluoridation of Milwaukee's water supply revealed a significant reduction in the incidence of dental decay in all age groups, 5 through 13 years. Fluoridation levels were 0.9 parts per million in the winter and 0.7 parts per million in the summer.

The DMF index for a 7-year-old child was 1.29 prior to fluoridation and only 0.53 after 6 years of fluoridation, a reduction of some 59 percent in the amount of dental decay.

After fluoridation 8-year-old children showed decay in 46.9 percent of their 6-year molars; prior to fluoridation the comparable figure was 81.1 percent. Of the 6-year-old children entering the first grade this year, 31.0 percent were free from caries in their deciduous teeth; before fluoridation the percentage was 20.8.

During the 6-year period, the total cost of fluoridation was $240,468. The total saving in dental care necessary for permanent teeth was approximately $718,164. The annual per capita cost of fluoridation was estimated at 5½ cents.

A second study is projected 6 years from now after 12 years of fluoridation of Milwaukee's water supply.

Problems in the Diagnosis and Treatment of Gonorrhea

WARFIELD GARSON, M.D., M.P.H., and GERALD D. BARTON, M.D., M.P.H.

THE LIMITATIONS and special usefulness of clinical and laboratory techniques in the diagnosis of gonorrhea are not well understood by the average practitioner today. Many physicians and clinics, because of complacency or lack of ancillary aid in diagnosis, employ measures for the treatment, management, and control of this disease which appear poorly justified in the light of newer research findings.

Diagnosis in the female is a major factor in both the clinical and control aspects of gonorrhea. It is generally assumed that the best procedures for the diagnosis in women is by smears and cultures taken from appropriate sites and correlated with clinical data. Studies by the Public Health Service utilizing the very best clinical and laboratory groups indicate, however, that clinical information plus smears and cultures result at best in the diagnosis of only 50 to 75 percent of those females having gonorrhea (*1*, *2*).

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This indicates that the most sensitive, practical indicator of gonorrhea in the female is the anterior urethra of a susceptible male. Such information should clearly point out the limitations in current techniques for diagnosis and place in proper perspective the importance of the epidemiological diagnosis of this disease. Certainly our control efforts cannot succeed if one out of every two to four women who have gonorrhea cannot be detected by current laboratory procedures and are available in the community as a focus for continued transmission of the disease.

Penicillin Susceptibility

There is a rather commonly held concept that the organisms causing gonorrhea and syphilis are similarly highly susceptible to the action of penicillin. While this is true concerning *Treponema pallidum*, it is not, and never has been, true for *Neisseria gonorrhoeae*. It has always taken more penicillin per organism to achieve a minimal inhibitory concentration (MIC) for the gonococcus than for the treponeme. Furthermore, the gonococcus has been observed to have a wide range of susceptibility to the action of penicillin, depending upon the strain of the organism tested.

During the period 1945–47 several investigators tested more than 200 strains of *N. gonorrhoeae* and found that all were inhibited by 0.05 unit or less of penicillin per milliliter. In 1955, however, Thayer and asssociates of the Public Health Service Venereal Disease Experimental Laboratory found that of 31 strains tested, only 78 percent were inhibited in this

lower range, while 22 percent required 0.1 unit or more per milliliter. Subsequent studies by Thayer and associates (1957), Curtis and Wilkinson (1957), and others have shown that from 20–30 percent of the more than 500 strains tested were inhibited only by the higher levels of penicillin (see table). Thus, over the past decade natural isolates of the gonococcus have indicated a definite and continuing proportional decrease in sensitivity to penicillin (*3*). In the United States, strains of the gonococcus inhibited by a minimal concentration of penicillin as high as 0.333 unit per milliliter have been observed; and, in the past few years particularly, more and more natural strains inhibited by minimal concentrations above 0.1 and 0.2 unit per milliliter. These higher MIC's exceed levels obtainable by usual doses of the type of penicillin given in the recent past in clinics throughout this country (*4*). Under these circumstances we would, of course, expect to see treatment failures on the basis of dose of drug alone, and, indeed, this is exactly what has been observed in a number of clinics where studies have been carried out to determine this and other factors in the treatment of gonorrhea (*5–9*). While the time-dose relationship is not so apparent in gonorrhea as it is in syphilis for successful treatment, it is an important factor in approaching the logical and effective use of penicillin. Observations by Thayer and associates have shown that the bacteriocidal effect of penicillin on the usual strain of the gonococcus is detectable between the fourth and fifth hour of contact. From a practical standpoint such killing is usually complete by the 12th hour. Although a few strains tested on semisolid media were found to contain viable organisms through 24 hours of contact with penicillin, no strain has ever survived under these circumstances to 48 hours of exposure (*10*).

These investigators have also shown that cellular components can protect at least some of the gonococci from the action of penicillin. Using tissue culture techniques, it was observed that both HeLa cells and rabbit fibroblasts were capable of engulfing a certain proportion of the gonococci to which they were exposed. Further, it was demonstrated that penicillin, when applied to the medium, would kill extracellular gonococci but would not affect intracellular organisms. The presence of penicillin up to as long as 96 hours had no effect against the intracellular organisms, while at the appropriate MIC most extracellular daughter cells were killed within 5 to 12 hours. Inactivation of penicillin by penicillinase and changing either the osmotic relationships of the medium or disrupting tissue cells with engulfed organisms allowed for the recovery of the gonococci in a viable form on culture media up to as long as 240 hours thereafter. These recovered gonococci had the same MIC as the killed extracellular organisms. That the gonococcus is inevitably protected against all agents tested to

Reported studies on susceptibility of Neisseria gonorrhoeae to penicillin

Author	Survey dates	Number of strains	Percent inhibited by (units per milliliter)		Range
			0.06 or less	0.10 or more	
Lankford	1945	100	100	0	0. 005 –0. 025
Love and Finland	1945	24	100	0	. 002 – . 008
Romansky and Robin	1947	53	100	0	. 002 – . 060
Love and Finland	1947	104	100	0	. 002 – . 033
Love and Finland	1949	52	96	4	. 005 – . 333
Marcuse and Hussels	1950–52	232	99. 6	0. 4	. 008 – . 125
Schümmer and Hubbes	1951	100	98	2	. 004 – . 125
Love and Finland	1954	106	100	0	. 002 – . 033
Thayer and associates	1955–56	31	78	22	. 005 – . 200
Thayer and associates	1957	46	70	30	. 005 – . 200
Cradock-Watson	1957	200	81	19	. 008 – . 512
Curtis and Wilkinson	1957	302	80	20	. 004 – . 500
Thayer and associates	1958	40	92	8	. 0025– . 120

date under these circumstances has been shown by extension of this work to include not only penicillin but also a wide variety of antibiotic and chemotherapeutic agents (*11*).

Proposals

On the basis of these findings, Garson in 1956–57 proposed a working hypothesis for the treatment and management of gonorrhea which may be summarized briefly as follows (*4*).

- Sufficient penicillin must be given the patient so that the units per milliliter of serum will exceed the highest known MIC associated with any strain of the gonococcus in this country. Roughly, at this time, this would mean a serum level of 0.35 unit per milliliter.
- Such a level must be maintained in contact with the gonococcus for a period of at least 24 hours and preferably 48 hours. Based upon the laboratory in vitro work previously described, such time contact would allow for a complete bacteriocidal effect against any known gonococcus.
- Provisions should be made for treatment with very long-acting penicillin. This is necessary for two reasons: although 48 hours of exposure will kill all gonococci in vitro, we do not know when such exposure is liable to occur in vivo, particularly in the female. In other words, we could not treat a patient, obtain a 48-hour continuous penicillin blood level, and assume that the gonococcus in various foci in the female genitourinary tract had had an equal 48 hours of exposure. The second point is even more important. After being cured of gonorrhea, the individual may return to a milieu of venereal disease as a susceptible person and become reinfected in short order. It is possible with benzathine penicillin to obtain blood levels beyond 45 days in the human patient. While we do not know the exact minimum concentration of continuous penicillin that will protect an individual exposed to gonorrhea, it is known empirically that this system when applied does reduce the repeater load in venereal disease clinics.

This treatment is termed "antibiotic quarantine" by Dr. Ira Schamberg of the venereal disease clinics in Philadelphia, where he, as well as others, have demonstrated the effectiveness of this approach in reducing repeaters in attendance (*8, 9, 12, 13*).

There is yet another factor to be considered in relation to the use of a long-acting penicillin. If it is true that, particularly in the female, certain tissue cells of the genitourinary tract are capable of taking viable gonococci within them and protecting such organisms from the effects of penicillin as has been demonstrated in tissue cultures, then with the dissolution of the host cell, viable gonococci are available for the autoinfection of the host. As such viable gonococci could be released some weeks after the initiation of therapy, it is obvious that the presence of long-acting penicillin in such a patient would be a deterrent to autoinfection. I must stress here that this is a hypothesis and has not yet been confirmed by clinical research. Nonetheless, until we know more about the disease in this regard, it behooves us to take such action as would prevent the likelihood of its occurrence.

Preston and Dunsworth in 1957 found that of 135 female patients treated with 600,000 units of penicillin aluminum monostearate (PAM), 24.4 percent yielded positive cultures 7 or 14, or both, days after treatment (*7*). In a second series of 65 such patients, the dosage of PAM was increased to 1.8 million units and the followup time was shortened to 3 and 7 days after treatment. In this series, only 4.6 percent yielded positive cultures. Two additional groups were tested to verify the finding that the dosage of 600,000 units of PAM was inadequate for a high percentage of cure. Of 77 women treated with 600,000 units, 16.8 percent yielded positive cultures during followup. Of 106 women treated with 1.8 million units, only 3.8 percent yielded positive cultures. If the number of probable reinfections is deducted, these authors estimate that the true failure rate with 600,000 units of PAM is 13 percent. They conclude that 1.8 million units of PAM is necessary for an acceptable rate of cure in females.

Hookings has used a treatment regimen consisting of a mixture of 600,000 units of PAM plus 1.2 million units of benzathine penicillin G. (*5, 6, 13*). His treatment schedule, applied in a rapid casefinding gonorrhea program, includes not only diagnosed early gonorrhea in women but also the prophylactic treatment of

all other women brought to observation; in addition, he has submitted men to this treatment schedule.

The results may be described briefly as follows: Using the attendance of diagnosed male cases as the criterion of success, the number of such cases was reduced by 18 percent at the end of 9 months and further reductions have occurred in subsequent experience. There was a decline also in the number of women who, having been named as contacts, were again named within 60 days. This decline was from 15 percent with the treatment previously employed (that is, 600,000 units PAM alone) to approximately 1.7 percent with the 1.8-million-unit dosage of mixed treatment.

In the light of today's knowledge, we must raise our sights in the treatment of gonorrhea to higher levels of penicillin extending over a much longer time period than has been used in the past (*14*). I believe it is obvious that the control of gonorrhea can be enhanced by the application of this knowledge in treatment. The epidemiologist can feel more secure that his patient will not be reinfected before he has the opportunity of finding source and spread cases, and he will have a longer effective period during which investigations may be conducted to bring contacts to epidemiological or specific treatment. Of greater importance, the tendency of the gonococcus to develop further resistance to penicillin can be blocked.

The problem of uncomplicated gonorrhea in the male is of course considerably less difficult in relation to diagnosis and treatment. In these days of the rediscovery of nongonococcal urethritis (NGU), it would be wise to take routinely at least smears on male patients to aid in the differentiation between gonorrhea and NGU. When occasional treatment failures of gonorrhea occur and NGU has been excluded, cultures should be obtained and the susceptibility of the gonococcus to penicillin determined to aid as a guide in therapy. It is perhaps worth while, too, to remind the epidemiologists that British, Danish, and American investigators have reported what appears to be cases of asymptomatic gonorrhea in the male (*15–19*).

For many years, it has been rather widely accepted that the endotoxin of *N. gonorrhoeae*, responsible for the basic cellular pathology of the disease, was a protein. Recently, however, Tauber and Garson have obtained a protein material from the gonococcus which is consistent with all past criteria referable to the endotoxin of the gonococcus (*20*). In an attempt to increase the toxicity and lethality of this endotoxin to animals and to purify the endotoxin for chemical characterization, they found that most of the toxicity could be related to nucleoprotein (*21*). By applying techniques unavailable to workers of the past, they were able to separate a previously unknown lipopolysaccharide phosphate from the protein endotoxin. The bulk of the toxicity was to be found in this phosphate rather than the nucleoprotein (*22*). If these new studies are confirmed, it would appear that the endotoxin of the gonococcus is not a protein, but rather a lipopolysaccharide.

This observation would be of extreme importance in relation to development of specific antigens for serologic testing for gonorrhea, as well as to the possible development of a relatively specific skin test for the disease. Further, as saccharide antigens are usually more closely related to protective immunity than are protein antigens, such studies may lead to a means of developing hyperimmunity in the host sufficient to protect against naturally acquired gonorrhea.

It appears we are once again upon the threshold of a renaissance in new knowledge about the gonococcus and gonorrhea. One of the many areas of findings being pursued is the exciting research concerning the adaptation of the fluorescent antibody techniques to the gonococcus, which could allow for the specific detection of gonococci in a stained smear within 30 minutes or the utilization of this technique for a serologic test for the disease (*23*). If this research is successful, it may be reflected in our clinical and public health practice in the not too distant future.

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Quarantine Data

★ The number of people detained in ports of entry for medical observation in fiscal year 1959 increased nearly 400 percent, from 124 in fiscal year 1958 to 607 in 1959. This sharp increase was due largely to the outbreak of smallpox in Heidelberg, Germany, in December 1958.

★ The number of incoming travelers who were allowed to continue to their destinations in the United States but were required to be under medical surveillance for a time because of possible exposure to a quarantinable disease, increased more than 100 percent, from 58,083 in fiscal year 1958 to 117,310 in 1959. Most of these persons came from areas where there were occurrences of smallpox and yellow fever. In cases where the danger of exposure was serious, the Foreign Quarantine Service notified local health officials at the destination of the traveler.

★ In fiscal year 1959, 5,264,354 persons subject to quarantine inspection arrived in the United States, both aliens and returning citizens. This was an increase of more than 2 million over 1949.

★ In fiscal year 1959, there were 70,607 inspections of airplanes for quarantine or immigration-medical purposes, an increase of 50 percent over 1949. There were 33,271 inspections of ships, an increase of 37 percent over 1949.

★ The Public Health Service has increased its vigilance against yellow fever in two ways: control measures in the United States and cooperation with other countries.

To reduce the number of *Aedes aegypti*, the yellow fever mosquito, the Public Health Service has recently carried out a survey and control program at more than 100 international airports and dock areas in the southern States, Hawaii, Puerto Rico, and the Virgin Islands, and at Mexican border crossing points. Highest "population index" was nearly 10 percent in Key West, Fla.; that is, mosquito larvae were found in 10 percent of the premises surveyed there. By an all-out campaign against the mosquito, the Key West health department reduced the index to less than 3 percent.

In Miami, the index at the international airport was 4 percent in July 1957. The Foreign Quarantine Service and the local health department set out to reduce this index and was so successful that during a 6-month period in 1959, when the weather was most favorable to insect breeding, no yellow fever mosquitoes were found at the airport.

★ At the Mexican border, local crossings subject to quarantine inspection totaled an estimated 90,000,000; crossings from the interior of Mexico, 1,500,000; migratory labor examinations, 440,000. The staff numbered 124.

★ The 1959 Foreign Quarantine Service budget for activities at United States ports was $3,950,869.

Statistics of the Foreign Quarantine Service, Public Health Service, fiscal year 1958–59.

Stations	Number of inspections		Number of inspections of passengers and crew		Number of inspection personnel [1]
	Vessels	Planes	Vessels	Planes	
Mobile, Ala	986	1	41, 182	15	6
Anchorage	1	830	35	34, 775	[2]
San Diego	560	551	25, 098	2, 182	4
San Francisco	1, 051	294	104, 419	9, 960	7
Los Angeles	1, 974	2, 364	86, 956	77, 254	8
Jacksonville	676	22	12, 766	106	1
Miami	1, 998	19, 293	14, 000	248, 067	27
Tampa	1, 032	859	19, 458	5, 437	8
Honolulu	360	3, 346	55, 917	165, 030	5
Chicago	73	1, 139	1, 100	43, 620	2
New Orleans	2, 271	2, 053	81, 582	64, 440	9
Baltimore	1, 688	43	59, 581	1, 735	8
Boston	934	2, 688	40, 080	95, 480	12
Detroit	85	432	34	17, 103	1
New York City	5, 655	18, 837	901, 466	874, 269	80
Philadelphia	2, 349	92	85, 403	4, 298	9
Fort Monroe, Va	1, 897	4	70, 165	245	9
Galveston	501	2	21, 874	79	5
Seattle	524	462	58, 949	11, 041	5
San Juan, P.R	760	4, 578	50, 683	85, 507	6
Smaller stations	7, 896	12, 717	225, 012	119, 200	20
Total	33, 271	70, 607	1, 955, 760	1, 859, 843	232

[1] Includes medical officers, quarantine inspectors, and sanitation inspectors. Does not include part-time contract personnel.
[2] Coverage provided by contract personnel.

Fluorescent Antibody Tests for Detection of the Gonococcus in Women

W. E. DEACON, WILLIAM L. PEACOCK, Jr., ELIZABETH M. FREEMAN, AD HARRIS, and WILLIAM L. BUNCH, Jr., M.D.

THE successful application of the fluorescent antibody (FA) method for the identification of *Neisseria gonorrhoeae* in men prompted an investigation of the use of this method for the detection of gonococcus in women. The preparation and use of fluorescein-labeled antiserums for the detection of the gonococcus in males was described in a previous publication (*1*).

Conventional culture procedures for *N. gonorrhoeae* identification in females, though recognized as superior to any other methods presently available, are slow, cumbersome, and costly in performance. Because of this, the culture method has been largely abandoned in many laboratories. The development of a more rapid, and a less complicated gonococcal detection method would therefore appear to have much to offer in future venereal disease programs aimed at the control of gonococcal infections.

In a recent study of gonorrhea in female contacts, Goldstein (*2*) found 16 percent positive by culture. Mahoney and associates (*3*) reported 21 percent positive in an examination of 2,429 women of the prostitute class. Stuart and Crookes (*4*) identified the gonococcus in 20.3 percent of 2,288 women examined at the main venereal disease clinic of the Provincial Division of Social Hygiene, Edmonton. H. R. Morton found 47.4 percent of the female contacts in his study group to be positive (personal communication). From these and other reports (*5*), it may be concluded that the culture method, when performed under the most favorable circumstances, is capable of detecting the gonococcus in women in from 16 to 47.4 percent of the cases.

The aim of this study has been the development of a rapid fluorescent antibody procedure for *N. gonorrhoeae* detection, capable of obtaining equal or superior results to those reported for the culture method.

Dr. Deacon is a microbiologist, Mr. Peacock and Miss Freeman are bacteriologists, and Mr. Harris is director of the Venereal Disease Research Laboratory, Venereal Disease Branch, Communicable Disease Center, Chamblee, Ga. Dr. Bunch is venereal disease control officer, Fulton County Health Department, Atlanta, Ga.

Materials and Methods

Female subjects, constituting the study group, were named contacts of men with gonorrhea seen at the clinic of the division of venereal disease control, Fulton County Health Department, Atlanta, Ga. The usual methods were used in performing pelvic examinations, and no special or unusual techniques were employed in obtaining specimens.

Direct Fluorescent Antibody Method

Specimens were obtained from three sites; the urethra, vagina, and cervix, by means of sterile, cotton-tipped applicator sticks. Slides were prepared in duplicate for smears from each site. Smears were fixed and stained for 1 hour at 37° C., and conjugates were prepared as described previously (*1*), except in the present study a 24-hour, heat-killed (100° C. for

1 hour) *Aerobacter cloacae* culture (Jordan strain) was used for control and removal of free fluorescein. Conjugates which stained heat-killed *A. cloacae* smears were absorbed with an equal volume of saline-washed, packed cells. Absorption with an equal volume of saline-washed, dried beef bone marrow (Difco) was also used for the same purpose and with similar results. Leitz and Reichert ultraviolet light microscope assemblies were used for determining fluorescents. A desirable contrast between background and specific *N. gonorrhoeae* fluorescents was obtained by the proper selection of filters. A blue background was used to define the gonococcus in an intracellular position.

The recognition of *N. gonorrhoeae* by direct FA constituted a complete test or identification (fig. 1). Photomicrographs were recorded on Super Anscochrome daylight film using a basic exposure time of 5 minutes.

Delayed Fluorescent Antibody Method

Slants (30 mm. butt and 30 mm. slant) were prepared from Difco GC medium base plus hemoglobin and supplement B. This medium was placed in 15- by 125-mm. tubes sealed with culture tube closures B16 (*7*). Specimens were collected by means of sterile, cotton-tipped applicator sticks as described for the direct FA procedure. Slants were inoculated immediately after specimen collection by rotating and rubbing the swab over the surface of the medium. The stick was then broken so that the cotton swab remained in the tube, supported by the butt. After inoculation, slants were immediately placed in a candle-jar and held at room temperature until subsequent inoculations were performed from another patient, at which time the jar was again opened. After completion of specimen collections (4-6 hours), candle-jars were incubated for 16–20 hours at 35° C. Slant growth was mixed by the original swab left in the tube. This swab was also used to prepare heavy smears. These were allowed to air-dry. All delayed FA smears were fixed for 10 minutes in 3 percent formalin in phosphate buffered saline pH 7.2. This was followed by a distilled water rinse. Slides were finally blotted and allowed to air-dry. Subsequent staining with fluorescent

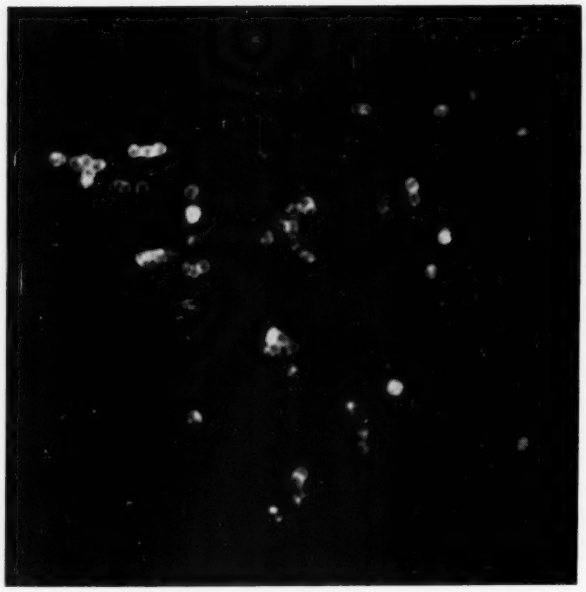

Figure 1. Identification of Neisseria gonorrhoeae in vaginal smear by the direct fluorescent antibody technique

antibody and microscope observations were the same as for direct FA. The demonstration of *N. gonorrhoeae* constituted the complete test (fig. 2).

Culture Method

The medium used for petri plates, the method of obtaining the specimen, inoculation and candle-jar procedure were as described under delayed FA. After plates were incubated for 24 hours at 35° C., they were examined for oxidase-positive colonies, and purification by replatings was instigated. CTA medium (BBL) plus 0.5 percent carbohydrate and 0.1 percent cornstarch was used for fermentation studies.

Results

Table 1 compares the direct and delayed fluorescent antibody methods with the conventional culture identification of the gonococcus. In the detection of individuals harboring *N. gonorrhoeae*, culture and the delayed FA procedures appear to be in agreement, each demonstrating 58 percent positive results. The delayed FA method, however, shows a higher degree of sensitivity in relation to total sites tested, 71 compared with 67 for the culture

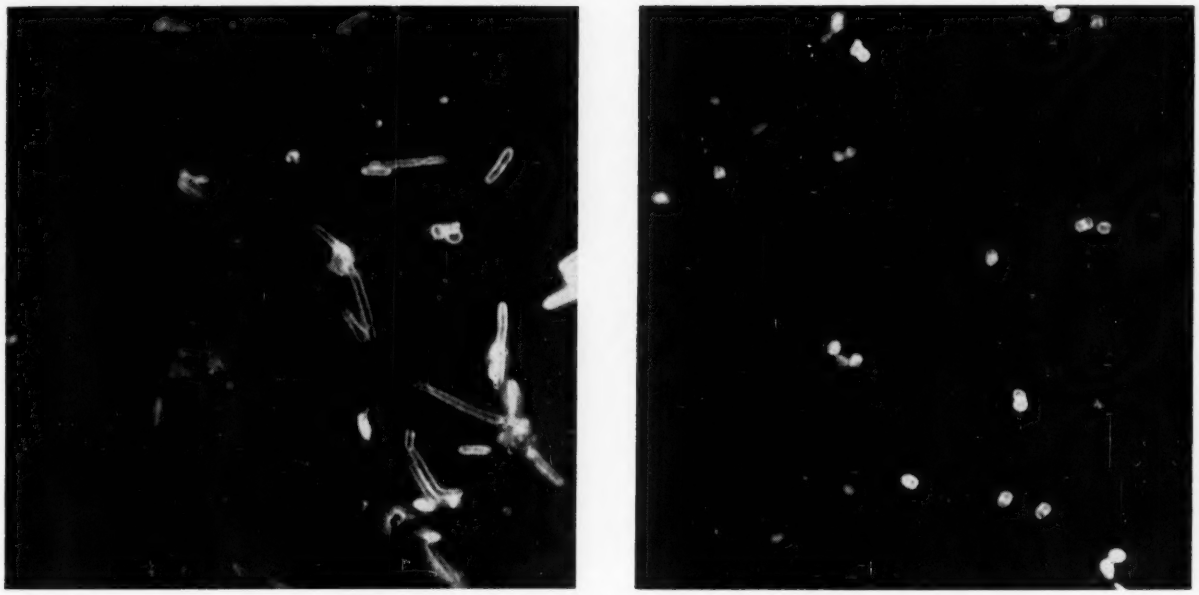

Figure 2. Delayed fluorescent antibody method: Note on left heavy contamination as seen by tungsten illumination. On right-hand side is the same field under ultraviolet illumination showing well-defined gonococci.

technique. It will be noted in this regard that if culture alone had been used on cervical examinations, two individuals harboring *N. gonorrhoeae* would have gone undetected. Similar findings were also obtained in urethral examinations, 22 positives being detected by the delayed FA, and 20 by culture.

In contrast to the delayed FA technique, the direct FA procedure obtained positive results in 26 percent of all patients, or 41.4 percent of those proved by the delayed FA technique. In no case did direct FA demonstrate positive results without also obtaining similar findings by the delayed FA method. Invariably, when one or more sites (vagina, urethra, or cervix) were found positive by direct FA, two or more sites in the same individual were detected by the delayed FA method.

A further comparison of the direct and the delayed FA procedures is shown in table 2. As in the first series of patients, 58 percent of this group also demonstrated positive findings by the delayed FA method. Direct FA detected 24 percent of the individuals harboring *N. gonorrhoeae*. The delayed technique produced positive results in urethral smears in 38 percent of the patients, 44 percent positive were demonstrated from the vagina, and 46 percent from the cervix smears. If positive sites are combined, vagina and urethra examinations account for 50 percent of the gonococcus detections, vagina and cervix for 55 percent, and a combination of all three sites for the highest result, or 58 percent.

Discussion

Direct FA identification of the gonococcus in females as demonstrated in this study may be accomplished in approximately 1 hour. It is obvious, however, that *N. gonorrhoeae* detection by this method is limited and dependent upon quantity of pathogens at the site at the particular time of examination. This effect is minimal when the delayed FA procedure is used. If one considers fluorescent antibody identification from the practical application standpoint, a saving of 3 to 9 days over the conventional culture procedures is effected. Other savings, of course, include the technician's time, culture media, and equipment.

One of the unexpected results was the high percentage of positive findings in vaginal examinations. Although culture findings (table 1) appear to be nearly equal to those demonstrated by the delayed FA technique, one must consider that cultures were performed under nearly ideal conditions. It should be empha-

Table 1. Comparison of culture and direct and delayed fluorescent antibody methods for identifying gonococcus, 50 female contacts

Method	Positive vagina		Positive cervix		Positive urethra		Total sites positive		Total patients positive	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Direct FA	13	26	4	8	5	10	22	14. 6	13	26
Delayed FA	24	48	25	50	22	44	71	47. 3	29	58
Culture	24	48	23	46	20	40	67	44. 6	29	58

sized, particularly in relation to vaginal examinations, that culture results were obtained only through laborious platings and multiple isolation attempts prior to fermentation studies. Vaginal examinations (presumptive and confirmation by fermentations) frequently required 10 days or more for completion. This was also true for other examination sites where heavy contamination complicated *N. gonorrhoeae* identification.

The following are offered as well-defined procedures for the rapid identification of *N. gonorrhoeae* in females by the direct and delayed FA methods.

1. The greatest yield of positive findings may be expected if specimens from the vagina, cervix, and urethra are included in the examination. The vagina and urethra, as a combination will result in satisfactory findings, and may be used where complete clinic facilities are not available, such as examination table and speculum.

2. Duplicate smears from each site should be prepared. These are used for direct FA identification. At least one slant may also be prepared from each site and examined by the delayed FA procedure.

3. Direct FA slides demonstrating positive results constitute a complete examination. Delayed FA needs completion only if the direct procedure fails to demonstrate gonococci. If desired, delayed FA may be used to confirm direct FA findings.

4. Fixation of air-dried smears (direct or delayed) is best accomplished by 10 minutes in 3 percent formalin in phosphate buffered saline pH 7.2. This is followed by a thorough washing in distilled water, and finally blotting before application of fluorescent antibody. Positive findings from any site constitute a completed examination.

Summary

Fluorescent antibody methods have been developed for the rapid identification of *Neisseria gonorrhoeae* in women. A combination of the direct and delayed fluorescent antibody methods was clearly demonstrated as superior to the conventional culture method. The delayed FA method gave a slightly higher yield of positive results in less time than the conventional culture method. The delayed FA method was superior to the direct method alone. The value of vaginal examinations in addition to the customary urethral and cervical tests is indicated.

Table 2. Comparison of the direct and delayed fluorescent antibody methods for identifying gonococcus, 100 female contacts

Method	Positive vagina		Positive cervix		Positive urethra		Total sites positive		Total patients positive	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Direct FA	9	9	8	8	7	7	24	8. 0	24	24
Delayed FA	44	44	46	46	38	38	128	42. 6	58	58

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Evaluation of tpcf-50 Test And Other TPCF Tests For Syphilis Diagnosis

HILFRED N. BOSSAK, WILLIAM P. DUNCAN, AD HARRIS, AND VIRGINIA H. FALCONE

In recent years, the *Treponema pallidum* immobilization (TPI) test has become one of the most valuable laboratory aids in resolving problem cases in the diagnosis of syphilis. Because of its expense and complexity, however, its use has always been limited to a few large, central laboratories. The phenomenon of immobilization of *T. pallidum* in the presence of treponemal antibody and complement was first used in a serologic test for syphilis described by Nelson in 1949 (*1*). Since then, there have been continuing efforts by many workers to devise other procedures employing the *T. pallidum* as an antigen in serologic tests which might be more simply and rapidly performed, and which might serve as substitutes for the TPI test. Demonstration of an antibody in syphilitic serum which would agglutinate suspensions of killed *T. pallidum* (*2*), and the immune adherence phenomenon (*3*) resulted in the development of serologic tests (*4–7*) which used the whole, killed treponeme as an antigen. One of the most recent promising developments has been the application of fluorescent antibody techniques to the detection of treponemal antibodies (*8*).

The use of an extract of the *T. pallidum* as an antigen in a conventional complement fixation test was described by Portnoy (*9*) in 1955. This sodium desoxycholate extract was used in a modified one-fifth volume Kolmer test and was designated as the *Treponema pallidum* complement fixation (TPCF) test (*10*). The procedure (TPCF I) and an experimental modification (TPCF II) were entered and performed by Portnoy in the Serology Evaluation and Research Assembly (SERA) Study (*11*). A second modification, referred to as the "tpcf-50" test, has recently been described by the same author (*12*), and is referred to as the preferred method, because of increased specificity and economy of time and reagents.

This report presents the comparative results obtained with the three *Treponema pallidum* complement fixation tests and the *Treponema pallidum* immobilization (TPI) test on serums from donors in selected patient categories.

Mr. Bossak, Mr. Duncan, and Mrs. Falcone are bacteriologists with the Venereal Disease Research Laboratory of the Communicable Disease Center, Chamblee, Ga., of which Mr. Harris is director.

Materials and Methods

A serum bank has been established at the Venereal Disease Research Laboratory, Communicable Disease Center, Chamblee, Ga., to facilitate evaluation of new serologic tests for syphilis or modifications of published methods. This bank is composed of serums from clinically categorized donors, and includes residuals from approximately 1,200 specimens which were included in the SERA study, in addition to serums from other sources. Convenient aliquots of unheated serum from these selected donors are stored in the frozen state and are drawn from the bank as needed.

The serums are classified in the following donor categories:

PRESUMED NONSYPHILITIC

- Apparently healthy donors presumably with no history of previous or present infection with syphilis.

SYPHILITIC

- Donors with primary syphilis proved by darkfield examination, who had not received treatment.
- Patients having had primary syphilis proved by darkfield examination and who had adequate treatment with 2,400,000 units or more of penicillin not less than 2 nor more than 4 years prior to time blood was taken.
- Donors with secondary syphilis proved by darkfield examination, who had not been treated.
- Patients with secondary syphilis proved by darkfield examination who had adequate treat-

ment with 2,400,000 units or more of penicillin not less than 2 nor more than 4 years prior to time blood was taken.

- Donors with latent syphilis, adequately treated with 4,800,000 units of penicillin.
- Donors with clinical manifestations of late syphilis, such as paresis, tabes, aortic insufficiency, and aneurysm, adequately treated with 4,800,000 units or more of penicillin.
- Donors with late asymptomatic neurosyphilis or unspecified type of neurosyphilis, adequately treated with 4,800,000 units or more of penicillin.
- Donors with manifestations of late syphilis such as aortitis or unspecified type of cardiovascular syphilis, adequately treated with 4,800,000 units or more of penicillin.

With Conditions Other Than Syphilis

- Hospital patients with a variety of diseases or conditions, not receiving antibiotics and having no history or clinical evidence of syphilis.
- Patients 12 years of age or younger with yaws.
- Patients with pinta, below age at which associated syphilis might be expected.
- Leprosy patients not thought to have associated syphilis.

Biologic False Positives

- Patients with reactive nontreponemal tests, at least one nonreactive TPI test, and no clinical evidence of syphilis.
- Patients with reactive nontreponemal tests with no clinical evidence of syphilis and who had no previous TPI test.

Complement Fixation Tests

The TPCF I and TPCF II tests were performed according to the techniques described in the SERA study (*11*), and testing was accomplished at the Venereal Disease Experimental Laboratory, Chapel Hill, N.C.

The tpcf-50 test was performed at the Venereal Disease Research Laboratory in Chamblee, Ga., in accordance with the method described in the Manual of Serologic Tests for Syphilis, 1959 (*13*). Antigen for this test was furnished by the test author.

The TPI test was performed at the Venereal Disease Research Laboratory as described in the manual and was also referred to as "TPI–200" in the SERA study (*11*) conducted by the Public Health Service.

The TPCF I, TPCF II, and the TPI results on 1,208 SERA study specimens were taken from the SERA study report (*11*). The tpcf-50 test was performed at a later date at this laboratory on residuals of these same serums which had not been previously heated or tested and had been stored in the frozen state in tightly sealed containers since the original date of collection and separation of serum. The numbers of these specimens were coded so that the testing activity had no prior knowledge of the results obtained with the tests previously performed in the SERA study. An additional 263 specimens in the presumed nonsyphilitic category, which had not been included in the SERA study, were also tested in the tpcf-50 test. The TPI test was performed on all specimens in this group which were not nonreactive with the tpcf-50 test.

Results

The results obtained with the three *Treponema pallidum* complement fixation tests and the TPI test on 326 presumed nonsyphilitic donors are shown in table 1. The reactivity rates of the TPCF I (13.5 percent) and the tpcf-50 (13.8 percent) tests were almost identical, but were almost five times as great as were obtained with the TPI test (2.76 percent). The tpcf-50 test was also performed on an additional 263 specimens in this donor category, which were not included in the SERA study and reactive results were obtained in 15 in-

Table 1. Results of the TPCF tests and TPI test on presumed nonsyphilitics

Test	Nonreactive		Reactive [1]	
	Number	Percent	Number	Percent
TPCF I	282	86.50	44	13.50
TPCF II	256	78.53	70	21.47
tpcf-50	281	86.20	45	13.80
TPI	317	97.24	9	2.76

[1] Including weakly reactive.

Table 2. TPCF and TPI test results obtained on 477 serums from patients in eight categories of syphilis

Category	Number of specimens	TPCF I		TPCF II		tpcf-50		TPI	
		Reactive [1]		Reactive [1]		Reactive [1]		Reactive [1]	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Primary, untreated	119	80	67. 23	84	70. 59	87	73. 11	45	37. 82
Primary, treated	29	11	37. 03	15	51. 72	16	55. 17	6	20. 69
Secondary, untreated	84	82	97. 62	83	98. 81	83	98. 81	82	97. 62
Secondary, treated	18	11	61. 11	16	88. 89	16	88. 89	11	61. 11
Latent, treated	24	20	83. 33	22	91. 67	19	79. 17	22	91. 67
Late, treated:									
With clinical manifestations	63	54	85. 71	56	88. 89	55	87. 30	62	98. 41
With asymptomatic or unspecified neurosyphilis	112	105	93. 75	105	93. 75	102	91. 07	109	97. 32
With aortitis or unspecified cardiovascular	28	21	75. 00	19	67. 86	23	82. 14	26	92. 86

[1] Including weakly reactive.

stances. The TPI test, performed on these tpcf-50 reactive serums, was reactive in two instances, weakly reactive in 1, and nonreactive in the other 12.

In primary syphilis, the tpcf-50 test was the most reactive of the treponemal complement fixation tests, and the TPI test was the least reactive of the four procedures (table 2). In untreated secondary syphilis, all four tests showed a high degree of reactivity, but in treated secondary syphilis, the TPCF II and the tpcf-50 tests were considerably more reactive than either the TPCF I and TPI tests, which gave identical findings. In latent and late syphilis, the tpcf-50 and TPCF I tests were in close agreement but were consistently less reactive than the TPI test.

Results obtained in four categories of diseases other than syphilis showed the tpcf-50 test to be in closer agreement with the TPI than was the TPCF I test of hospital patients with a variety of diseases having no history or clinical evidence of syphilis (table 3). In yaws and pinta, all four tests were 90 to 100 percent reactive. In a group of 29 patients with leprosy, one reactive result was obtained with both the tpcf-50 and TPCF I tests and two with the TPCF II modification. No reactive results were observed in this group with the TPI test.

Table 3. TPCF and TPI test results obtained from donors with diseases or conditions other than syphilis

Category	Number of specimens	TPCF I		TPCF II		tpcf-50		TPI	
		Reactive [1]		Reactive [1]		Reactive [1]		Reactive [1]	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Variety of conditions in hospital patients	73	8	10. 96	11	15. 07	6	8. 22	5	6. 85
Yaws	36	35	97. 22	35	97. 22	36	100. 00	36	100. 00
Pinta	50	46	92. 00	46	92. 00	46	92. 00	47	94. 00
Leprosy	29	1	3. 45	2	6. 90	1	3. 45	0	0. 00

[1] Including weakly reactive.

Table 4. TPCF and TPI test results obtained from donors classified as biological false positive reactors

Category	Number of specimens	TPCF I		TPCF II		tpcf-50		TPI	
		Reactive [1]		Reactive [1]		Reactive [1]		Reactive [1]	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Nontreponemal test, reactive, TPI nonreactive	111	11	9. 91	14	12. 61	10	9. 01	5	4. 50
Nontreponemal test reactive, no clinical evidence	109	444	40. 37	47	43. 12	34	31. 19	38	34. 86

[1] Including weakly reactive.

All of two groups of donors classified as biological false-positive reactors were reactive in one or more nontreponemal tests in the absence of any clinical or anamnestic evidence of syphilitic infection (table 4). In a group limited to patients who were previously nonreactive in at least one TPI test, almost identical reactivity rates were obtained with the TPCF I and tpcf-50 tests (9.91 percent and 9.01 percent, respectively), but these were approximately twice that of the TPI test (4.05 percent). Although it might be expected that the TPI test would be completely nonreactive in this group because of the method of preselection of donors, the five TPI reactions obtained among these patients could be attributed to the fact that the procedure used in screening these patients may have been less reactive than the modification used in this study. Where the biological false-positive diagnoses were made by clinical impression without previous TPI test screening, all four tests were more reactive than among those who were not reactive to the TPI test, possibly due to the presence of syphilis, treated or untreated, in this group of donors. The TPI and tpcf-50 tests, however, were in closer agreement than the other two tests, in this last category.

Summary

The three TPCF tests and the TPI test were used on serums from donors in selected categories and results compared.

1. In the presumed nonsyphilitic group, the tpcf-50 test and the original TPCF were in close agreement. However, the reactivity rate of both tests was five times greater than that of the TPI test.

2. In primary and secondary syphilis, the tpcf-50 test was either comparable to or more reactive than the TPCF I and TPI tests, but in latent and late syphilis, with the exception of neurosyphilis, all three TPCF tests were consistently less reactive than the TPI test.

3. In diseases other than syphilis, excluding the treponemal diseases yaws and pinta, the TPI test gave fewer reactions than the three TPCF procedures.

4. In the group of donors preselected by at least one nonreactive TPI test, approximately 5 percent (5 of 106) of the patients who were nonreactive with the TPI test in this study were reactive in the tpcf-50 test.

5. In the group of donors diagnosed as biological false-positive reactors by clinical impression and without previous screening with a TPI test, the reactivity rate was approximately the same with the tpcf-50 and TPI tests.

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Research Support by Foundations and Health Agencies

During 1957, $95 million was spent for scientific research and development by private philanthropic foundations and voluntary health agencies in the United States, the National Science Foundation reports. Of 4,067 private foundations surveyed, 438 reported research and development programs and a total outlay of $72 million. Twenty-five of 30 voluntary health agencies reported expenditures of $23 million.

Basic research received $59 million of the total spent. Private foundations gave major support to the life sciences, about 45 percent of their total expenditures; social sciences were next in dollar support; physical sciences received the least. Almost one-half of the expenditures reported by the voluntary health agencies were to support biological and medical research.

Most of the expenditures were in the form of grants to outside organizations and individuals. Educational institutions and affiliated medical schools and hospitals were the major recipients.

These and other findings are a summary of preliminary data compiled for the National Science Foundation by the Bureau of Labor Statistics of the U.S. Department of Labor and published under the title "Research and Development Expenditures of Foundations and Health Agencies, 1957" as No. 15 of the Foundation's series "Reviews of Data on Research and Development."

Q fever in bovines, present in only 7 States in 1949, is now reported in 35 States. While the incidence of bovine infection appears to be increasing, the extent of transmission to man remains to be determined.

Report on the Nationwide Occurrence of Q Fever Infections in Cattle

LAURI LUOTO, D.V.M., M.P.H.

SINCE 1947, Q fever has been recognized as a public health problem in certain areas of the United States, particularly in the Western States. Special investigations have shown that human cases, some of which are severe and protracted, commonly occur in endemic areas in Texas, California, and Idaho. Recent reports (*1*) indicating that Q fever occurs in other States emphasize the need for further investigation of this infection of animals and man. A systematic study of the infection in livestock and of associated human disease is required to define the problem.

Dairy cattle, which are a major reservoir of infection and thus an abundant potential source of human disease, develop only asymptomatic infections. After the causative agent, *Coxiella burnetii*, is introduced into a herd, many animals develop chronic infections and transmit the agent to other additions to the herd; thus the herd usually remains permanently infected. Sheep and goats also are sources of the disease but are of lesser importance because their more limited distribution results in fewer human contacts. Although infection cycles may occur among rodents and arthropods in nature, *C. burnetii* maintains an independent and more important airborne infection cycle among domestic livestock. This airborne transmission, along with the hardiness of the agent and its ability to persist in the environment, suggests a propensity for spreading and becoming a widespread public health problem.

Luoto (*1*) postulates that foci of Q fever occur and are spreading among dairy cattle in many areas of the United States and that the resulting gross environmental contamination will lead to frequent human infection and illness. In order to evaluate the public health significance of Q fever infections a three-phase study is planned: (*a*) the prevalence of the disease among dairy cattle will be determined by serologic surveys; (*b*) where foci of Q fever are found, surveys for human infection will be performed; and (*c*) the surveys will be followed, if indicated, by studies of the disease in man.

This is a report of findings dealing with the distribution, prevalence, and spread of Q fever among dairy cattle.

Dr. Luoto is senior veterinarian at the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, Public Health Service. The laboratory is located in Hamilton, Mont. This is the third of a series of papers by Dr. Luoto on the epidemiology of Q fever in the United States.

Method of Study

Information on bovine infection was obtained by cooperative surveys in which State or local health and agricultural groups in 26 States participated. Herd milk specimens and serums ob-

tained by existing collecting agencies, such as mobile brucella test or milk control laboratories, were tested for antibody against *C. burnetii*. Tests of individual samples of milk or serums, isolation of the agent by guinea pig tests, and epizootiological studies were performed when indicated. Results were confirmed and correlated at the Rocky Mountain Laboratory, Hamilton, Mont.

The capillary-tube agglutination test (CAT) was used to detect antibody against *C. burnetii* in milk and various serums (*2–4*). This test, used in Q fever studies since 1952, has been evaluated by other groups (*5,6*) and found to be specific, sensitive, and reproducible. A close correlation exists between the presence of the agent in milk and of agglutinating antibody in milk or serum of individual animals.

Recent studies by Tjalma (*7*) and those to be reported by Luoto and Brock of tests performed during 1958–59 in Montana and Idaho indicate the reliability of the method for testing pooled milk from entire herds; a positive result indicates the presence of one or more infected animals within the herd. Other studies by Krumbiegel in Wisconsin and Stoenner in Idaho during 1957–59 demonstrated that 79 to 84 percent of milk samples positive in the CA test yielded *C. burnetii* when inoculated into susceptible animals. The percentage of isolations increased directly with the titer of pooled milk, but the agent was not isolated from CAT-negative herd milk. While the exact sensitivity of this method for detecting infected animals within herds is uncertain, the test works effectively under field conditions. Infected herds and animals are being detected in areas where rates of infection among individual cows are only a fraction of 1 percent.

Distribution and Prevalence

Data now available demonstrate conclusively that Q fever occurs among dairy cattle in all parts of the United States. Bovine infections

Figure 1. The known distribution of naturally occurring Q fever infections in the United States

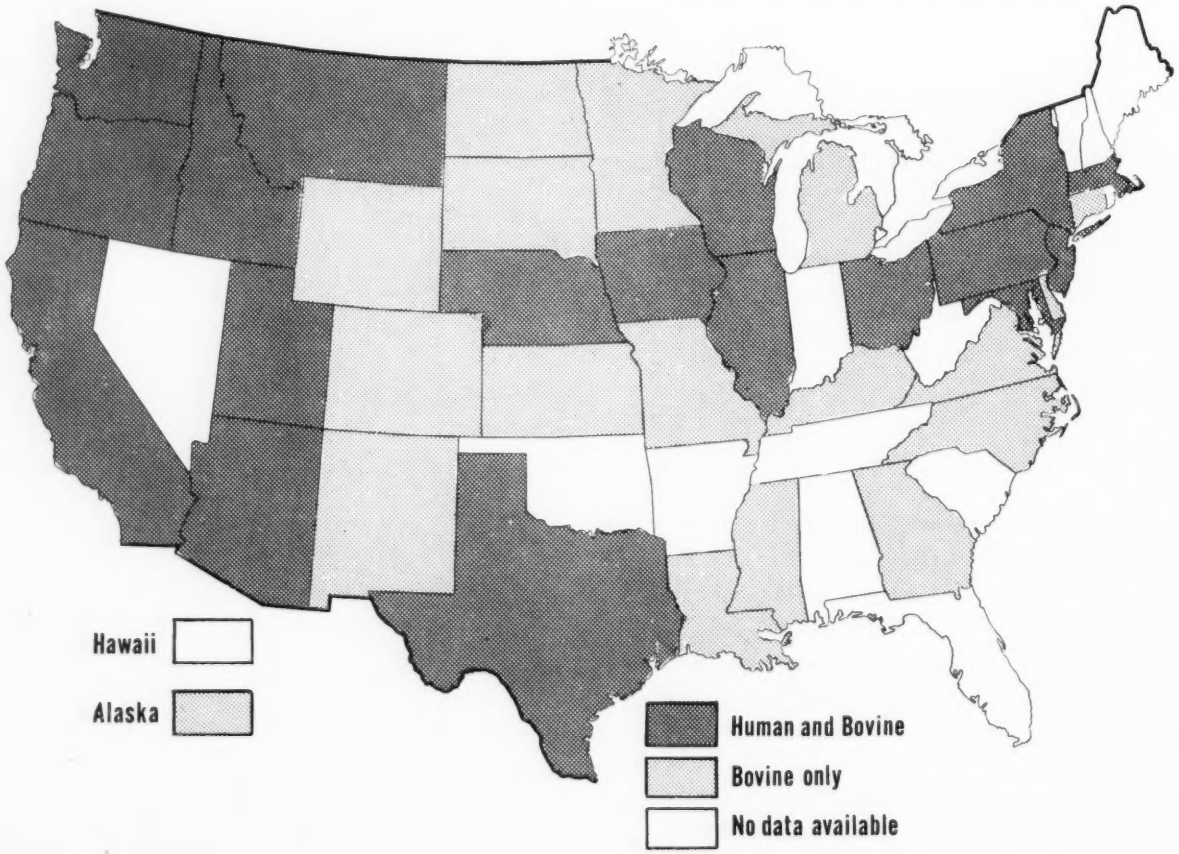
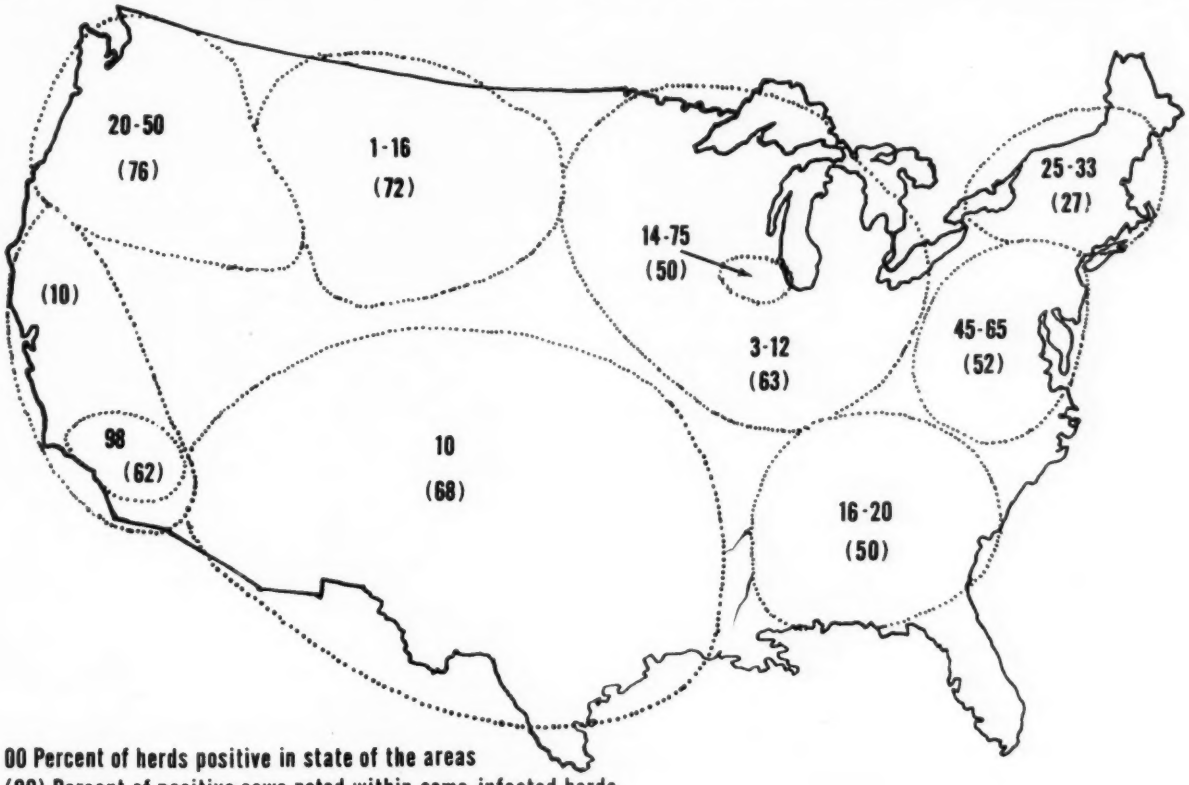


Figure 2. Prevalence of Q fever infection among dairy cows and herds in areas of the United States



00 Percent of herds positive in state of the areas
(00) Percent of positive cows noted within some infected herds

have been demonstrated in 35 States (fig. 1) and have been found recently in all States where a concerted search has been made. Earlier studies indicated that bovine infections were frequent in seven States; namely, California, Wisconsin, Ohio, Iowa, Texas, Arizona, and Idaho (*6–13*). The current surveys in 26 States of 24,551 herds including 353,905 cows confirm and expand earlier findings in some areas and prove the occurrence of considerable bovine infection in 19 additional States—Oregon, Washington, Montana, Wyoming, Utah, South Dakota, Minnesota, Nebraska, Illinois, Michigan, Georgia, North Carolina, Maryland, Pennsylvania, New Jersey, New York, Connecticut, Massachusetts, and Hawaii. Other, more limited, data suggest that bovine infection occurs in nine other States; namely, Louisiana, Mississippi, Virginia (*14*), Colorado, New Mexico, North Dakota, Kansas, Missouri, and Kentucky (*15*). It is likely that infections occur in the remaining 15 unstudied States, most of which are adjacent to or surrounded by infected areas.

An unexpectedly high herd infection rate was encountered in most sections of the country, ranging from 1 to 65 percent within the various States (fig. 2). The finding of high levels of infection among dairy herds along the supposedly infection-free eastern seaboard is of special interest. Wide distribution of foci and variation in prevalence of infection was apparent. Within States having even the lowest rates, up to 14 percent of the herds in some areas were infected. Nearly 100 percent of the herds were infected in areas having more widespread infection. In Wisconsin, with a 7.7-percent herd infection rate, 75 percent of the herds were positive in some counties (*9*).

Not only were herd infections widespread, but a high percentage of infection occurred among animals within herds (fig. 2). Studies of several hundred cows within a dozen herds in each of several parts of the country revealed that over 50 percent of the animals within some herds are positive. Such levels of infection also exist among cows in focal areas where herd infections are infrequent. In Montana, with only

Table 1. Recent observations on the prevalence and spread of Q fever among dairy herds

Region	1948–52		1958–59	
	Number tested	Percent positive [1]	Number tested	Percent positive [1]
Idaho, south-central	438 herds	1.0	751 herds	17.0
Eastern States	179 herds	<1.0	248 herds	47.0
Mountain States	900 serums	<1.0	315 serums	30.0
	364 herds	0	5,536 herds	1.2

[1] Early tests were done by complement fixation, except for group 1 milks, tested by guinea pig tests, and the 364 herds in group 3, by capillary test. All recent tests used the capillary method.

1 percent of the herds infected, up to 72 percent of the cows within infected herds were positive.

These data on the distribution and prevalence of bovine infection have been extracted largely from reports of participating groups. Detailed reports on studies within individual States will appear elsewhere. In confirming the findings of various investigators, isolations of the agent were made from milks collected in 10 "newly" infected States. Current information indicates that *C. burnetii* is already well-seeded among dairy cattle in all parts of the country.

Spread of Infection Among Bovines

Reports in the literature suggest spread of infection among bovines in California, Wisconsin, Ohio, and Iowa (*9,10,16*). Recent unpublished observations on the prevalence of bovine infection constitute more conclusive evidence of the spread of Q fever (table 1). These studies were done by CAT procedures while the earlier observations, except for the 364 herds from a mountain State, were based on guinea pig or complement fixation tests. The results are comparable, however, since the sensitivity of these test methods for detecting infections is quite similar (*2, 3*). These findings indicate that dairy herd infections in south central Idaho increased from 1 to 17 percent from 1951 to 1958 (*13*). A great increase occurred in an Eastern State where evidence of bovine infection was not detected in 1949, a little was present in 1952, but 47 percent of 248 herds tested were infected by 1959. Luoto and Stoenner have found that bovine infections increased appreciably in two mountain States between 1952 and 1958 (table 1). Other similar but perhaps less valid observations, because of inadequate baselines of infection, suggest that bovine Q fever is increasing in five Eastern States which

Table 2. Increase of Q fever infection observed among dairy herds in Montana counties and Idaho plants

Site	Montana			Idaho		
	Total tested	Number positive January 1959	Number positive May 1959	Total tested	Number positive October 1958	Number positive March 1959
Total	852	19	37	99	42	90
A	152	8	18	48	15	43
B	316	6	11	25	9	21
C	384	5	8	26	18	26
Percent positive		2.2	4.3		42.3	90.1

NOTE: Positive indicates herd milk reacted in capillary-tube agglutination test on whole milk.

previously had no evidence of infection (*15*) but now have from 20 to 65 percent of the herds infected. A recent resurvey of a large Iowa milkshed by Tjalma showed a 100 percent increase in herd infections over that detected a year earlier (*5*); a similar increase is being observed by Krumbiegel among herds being resurveyed after 2 years in a Wisconsin milkshed.

Specific studies of the spread of infection among cattle, currently underway in Montana and Idaho, indicate that Q fever is spreading in these rural areas (table 2). Montana, which was considered previously to be free of bovine infection (*3*), now has infection in 1.2 percent of the 5,536 dairy herds tested. Infections increased from 2.2 to 4.3 percent, or from 19 to 34 herds among 852 herds resampled in 3 counties during a 5-month period of 1959 according to unpublished survey data. Within the same period, infections of individual cows increased from 9 to 17 among 32 animals in 2 herds observed. Similar studies by Brock in a heavily infected area of western Idaho show that during a 5-month period, herd infection more than doubled, from 42.3 to 90.1 percent, among 99 grade A herds resampled. The spread of herd infection was not uniform within the same or different areas.

Thus, infection has been shown to be spreading under rural conditions in at least 13 States, regardless of the prevalence of bovine Q fever. While the prevalence and rate of spread appear directly related to concentration of dairy cows, undoubtedly other unknown factors are involved.

Correlation With Human Infection

As could be expected, human infections occur and are diagnosed in areas where Q fever is known to exist in animal reservoirs. As the result of special interest and studies, Q fever is already recognized as a public health problem in some areas. At least 300 human cases were detected in southern California (*17*), and 350 cases were associated with sheep in northern California (*18*), during epidemiological studies in 1948–49. Additional cases are encountered annually. Cases originating from cattle or sheep have been recognized for many years in Texas and south central Idaho where epidemics were studied in 1947 and in 1958 (*19,13*). Ten proven cases and evidence of infection in 85 individuals were found in Iowa by Tjalma where only 3 percent of dairy herds are infected. Human infection has been reported from 18 of the 35 States with known infected cows; an occasional human case is diagnosed in four "newly" infected States, namely, Maryland (*20*), Pennsylvania (*21*), New York, and New Jersey.

The true incidence of human infection, or of disease, within the United States is unknown because many cases are unrecognized. Even during the recognized epidemic in Idaho during 1958, most of the 93 laboratory-confirmed cases reported were diagnosed by about 10 percent of the local physicians, many of whom had diagnosed cases in previous years.

Significance of Findings

The demonstration of widespread bovine infection indicates that Q fever is endemic throughout the United States and that a nationwide problem already exists. The spread of infection even under dispersed rural conditions, as in Montana, sometimes occurs with rapidity and is a matter for concern. Universal bovine infection, similar to that in southern California where 98 percent of the herds are infected, may develop in other parts of the country. Such conditions are already approached in Western States, in Wisconsin, and in several Eastern States. The continuing growth of human and animal populations will result in crowding conditions even more conducive to spread of infection. Continued surveillance will indicate the development and scope of the animal disease problem.

In view of the widespread prevalence of bovine Q fever throughout the United States, information on associated human infections is urgently needed. Q fever is already a public health problem where the disease is endemic, with epidemic outbreaks, but the true magnitude of the problem in the United States remains to be determined. In many respects the failure to recognize Q fever in man is similar to the situation existing when brucellosis in man was first associated with a disease of cattle. From present knowledge concerning Q fever, it is difficult to conceive how infections

in man, perhaps even now occurring unrecognized, can fail to become even more widespread.

Regardless of any future implications, the presence of *C. burnetii*, a known pathogen, in animals and their products or environment presents situations which must be faced by responsible agricultural, industrial, and public health groups. Only through coordinated studies by many groups will data become available for evaluation of the problem. Public relations problems arise. Recognition and reporting of human infection should be promoted. Educational, diagnostic, and epidemiological services must be provided, along with possible regulatory and control measures.

Summary

Bovine Q fever must now be considered endemic throughout the United States, since infections are widespread and occur in all 35 States recently studied. Such infections are not only prevalent among cattle, sometimes to an alarming degree, but they are increasing and spreading even in rural areas. The spread of infection is expected to continue and may even accelerate in the future.

Human disease contracted from livestock is already a public health problem in some areas and is being recognized in others previously considered to be free of infection. Unrecognized human disease may occur in areas now known to contain endemic bovine infection.

Concerted nationwide studies of the occurrence and epidemiology of the disease are needed to define factors bearing on its occurrence and spread. Stimulation of the recognition and study of Q fever in man is necessary to ascertain the existence or possible development of a disease problem.

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METROPOLITAN HOSPITAL PLANNING

CONFERENCE REPORT

HAS the time come for the Hill-Burton hospital and medical facility construction program to place more emphasis on the needs of the Nation's metropolitan centers?

This question was given serious consideration at a Conference of the Surgeon General with State and Territorial Hospital and Medical Facilities Survey and Construction Authorities held in Washington, March 9–11, 1959.

Hill-Burton State agency chiefs agreed that more attention should be directed to the growing dilemma facing metropolitan areas. The degree of emphasis, however, remained unsettled. General concepts evolved from the discussion were:

1. Urban hospital and medical facilities should be expanded in an orderly and coordinated manner.

2. Rural areas are not without medical facility problems, therefore continued attention should be given to their needs.

3. Geographic regions should be examined in order to view the problems of both metropolitan and rural areas in their proper perspective.

Prepared by John D. Thewlis, chief of the Operations Branch, Division of Hospital and Medical Facilities, Public Health Service.

The conferees, in examining the problems of metropolitan hospitals, found that the chief complaint appeared to be insufficient funds for necessary construction. The complaint is chronic and widespread and extends even to hospitals in smaller communities. It is the result of many factors.

Many of our older hospitals were built without future needs in mind and grew as money became available to meet a recognized local need. Little or no thought was given to coordination of medical and hospital facilities to serve communities efficiently and economically. Many now obsolete hospitals, built 50 or more years ago, find that replacement would be more economical than modernization of the existing building.

Advances in medical science and technological progress have resulted in the need for new and costly equipment as well as changes in architectural design of facilities.

Socioeconomic, cultural, and demographic changes in our society have resulted in a shift of medical needs. The longer lifespan of the population and the growth of suburbs are among the many trends affecting medical needs unforeseen prior to the thirties when many metropolitan hospitals were built.

The conferees suggested that a major step toward aid to hospitals would be establishment of planning agencies on a permanent basis for each metropolitan area.

Remarks by George Bugbee, president of the Health Information Foundation of New York City, set the pattern for the panel discussion that followed. Other members of the panel, which was moderated by Dr. Robert N. Barr, secretary and executive officer of the Minnesota Department of Health, were: Gordon R. Cumming, chief of the bureau of hospitals, California State Department of Public Health; Dr. John R. McGibony, professor of hospital and medical administration, Graduate School of Public Health, University of Pittsburgh; Ralph Murphy, executive director of the Hospital Council of Baltimore, Md.; and Dr. Helen Knudsen, director of the hospital services division, Minnesota Department of Health.

Bugbee, who played an important role in the development of the Hill-Burton Hospital Survey and Construction Act, emphasized that the program provided an incentive for developing more adequate hospital and medical care in this country, adding:

"There has been general acknowledgment and approval of the act both in serving its purpose and in its administration. As with any national program, there is continued need for reevaluation of operating principles. Currently, there is considerable concern about whether the act and the priorities it established now permit the granting of funds for facilities where they are most needed in every State."

Referring to the need for replacement of older hospitals which have been leaders in quality in metropolitan centers, he said that several years ago the American Hospital Association estimated that such replacement would cost in excess of $1 billion.

"Our oldest, largest, and finest general hospitals are located in cities," he said. "Evidence of the quality of patient care, teaching responsibilities, both graduate and postgraduate, and research, shows that these hospitals are our most important resources in maintaining and raising the quality of hospital and medical care nationwide."

While emphasis under the Hill-Burton program has been directed to rural needs, a relatively large proportion of funds has gone to larger centers of population. This is supported by Bugbee's analysis of Hill-Burton grants from 1947 through the end of 1958. Grants during this period totaled $1,091,801,000. He said that 45.7 percent of these funds was expended for all types of hospital and medical facilities in standard metropolitan areas where 56 percent of the Nation's total population lives. Central cities in these standard metropolitan areas which have 33 percent of our total population received 32 percent of the allocations. General hospitals have received 82 percent of all Hill-Burton funds, or a total of $895 million since passage of the act; 43 percent of this amount was earmarked for standard metropolitan areas and 29 percent for central cities within these areas.

Explaining that he did not intend to evaluate urban needs with a view toward shifting priorities, Bugbee pointed out that only with adequate planning can priorities be applied intelligently. There is currently a great upsurge in demands for better metropolitan planning, he emphasized.

Suburban growth was cited by Bugbee as a big complication. He noted that population shifts to the suburbs have changed the texture of the central city population and its ability to finance hospital care, resources available for capital fund raising, and distribution of physicians.

A community planning agency should be independent of other community organizations, Bugbee suggested. He explained that "The agency must be representative of the community. Its active members, particularly, should be selected for their objectivity, community-mindedness, and, in the instances that apply, for their sense of responsibility in raising funds. It would be desirable if the agency would be designated by the State planning agency as its affiliate organization in the metropolitan center. Planning is not a temporary function—the agency must be set up on a relatively permanent basis."

Another point emphasized is the need for further research to aid in establishing more definitive goals. This, Bugbee said, is essential

if urban hospitals are to maintain leadership in providing quality medical care, teaching, and research.

Gordon R. Cumming, of Berkeley, Calif., told the group that there is nothing "special" about metropolitan area planning. He suggested that "we must concentrate on the cities or the sub-orbits within them rather than plan grossly for a big group of 10 million people." He added that there is a surprising amount of useful information available about population trends, highway programs, and other such data needed in planning for the future. Referring to a study of the Los Angeles area, Cumming stated that "in tackling its planning, Los Angeles pegged the date 1975 toward which to build."

"As a second principle used in this study," Cumming stated, "we considered people and geography and distance and relationships, and evolved a concept of a central hospital service area and suburban areas, taking into account several characteristics. In each of the 14 hospital service areas, we defined the metropolitan community and where there should be a center with a community identity. Each of these areas have or will attain a population of at least 250,000 people by 1975.

"Third, we assumed the proposed traffic patterns for the future would persist. We'll still have traffic congestion in 1975, and we should plan for hospital services within about one-half hour's travel time. You can't travel very far even on a super-freeway in half an hour, if you count the time on a portal-to-portal basis.

"Finally, we asked what kind of institutions should serve these people and this geography? At first we thought of 200 beds as a minimum for a hospital, but upon the advice of people in the hospital field, this figure was reduced to 150."

The question of priorities (rural vs. metropolitan areas) was discussed by Dr. John R. McGibony, of Pittsburgh, Pa.

McGibony recalled that in the early days of the Hill-Burton program, considerable emphasis was placed on the needs of rural areas. He added that the time has now come "for us to direct more of our efforts toward meeting the needs of the urban, metropolitan areas."

In reviewing the approach taken in the theoretical blueprint of a coordinated system of hospitals, McGibony indicated there might have been more strength in such a system if the hub had been stronger. "The satellite facilities might have been stronger with a stronger central tie," he said.

McGibony noted that not enough emphasis has been placed on some factors in rising hospital costs. Referring to a recent article by Pat Groner, of Pensacola, Fla., he pointed out that the increase in use of existing X-ray facilities and laboratory services account for probably one-third of the increasing cost of hospital care, and that another one-third could be accounted for by other adjunct facilities and services.

"In meeting the demand," McGibony observed, "we tend to lose sight of the quality of care. If this is not a major item in planning, then most of the planning will go for naught, whether for diagnosis and therapy, prevention in both its primary and secondary aspects, or restoration or rehabilitation."

McGibony added that despite the fact that perhaps one-third of the internships and residencies in this country are served in nonprimary university-connected hospitals, the urban metropolitan hospital complex is the seed of education for the health profession. Certainly a majority of the clinical and related research is in that setting, he said, and such education leads directly to the supply of personnel for satellite facilities.

On fund raising, McGibony said that industry will contribute as a general rule about 50 percent of the total capital outlay for an institution. He added that metropolitan, urban, and rural planning has to be a combined responsibility of all voluntary and governmental agencies.

"Hospital councils are meeting this need," he continued. "In Pittsburgh we have more than 60 hospitals working together closely in the improvement of care, services, and planning."

Ralph Murphy, of Baltimore, Md., placed special emphasis on the problem of obsolescence in metropolitan area hospitals. However, he said that there is much more to a

hospital than the excellence of its physical facilities. "While physical facilities are important in a very real sense," he said, "the excellence of a hospital depends upon the people and staff." As an example, he stated that patients in pre-1900 beds do not necessarily receive poorer care than those in newer beds.

Murphy added that one of the major needs in metropolitan planning is to deal realistically with the problem of obsolescence. Furthermore, it is necessary to face up to the economics of the problem—especially as it relates to replacement versus modernization. This requires the development of measures of obsolescence which are realistic and meaningful to both the community and the hospital involved. Murphy explained that the position taken by the individual hospital regarding obsolescence is usually based upon its own situation and does not always correspond to the community viewpoint.

Murphy said it is agreed that the ring of very small hospitals in the suburbs is to be avoided. However, people are not reassured by statistics indicating that less than 1 percent requires a hospital within the first 10 minutes after an emergency. Therefore, suburban hospitals which are desirably sized and staffed are a vital component of the overall plan for adequate hospital service in a metropolitan area.

Agreeing with the need for additional research, Murphy pointed out that current planning must be based on the knowledge we have. He observed that frequently maximum use is not made of the vast amount of data already gathered.

Added to the obstacles facing hospital planners are the unpredictable and intangible factors which should be considered. An example is estimates of population growth. The erroneous predictions made by the demographers in the thirties could easily be repeated.

Two conclusions, based on the fact that hospital planning still is an inexact science, were drawn by Murphy. First, he said, planning must be flexible. Second, plans should be based on the needs and past experience of an individual community. He warned against the inadvisability of one community adopting plans which were devised to meet the needs of a different type of community.

Dr. Helen Knudsen, of Minneapolis, Minn., told of problems encountered in two metropolitan areas, Minneapolis and St. Paul, existing side by side, but operating independently. She said that assistance had been given Minneapolis in surveying needs as preparation for a united hospital fund raising drive. On the other hand, St. Paul does not have a planning group, each hospital raising its own funds.

"We're very concerned in our office," Knudsen said. "We have attempted for some time to persuade St. Paul authorities to organize an overall planning group."

The difficulties of hospital planners are not confined to metropolitan areas, Knudsen said, citing the real problem in rural development. She noted that at one time or another, practically every town in Minnesota has discussed construction of a community hospital, whether it needed a hospital or not. "I'm sure we can say that we spend as much time trying to discourage some of these smaller communities from building as we do trying to encourage others to plan and raise funds," she said.

However, after the would-be sponsors of a community hospital are convinced that it is not justified, they become very realistic and grateful for the advice, she added. Instead of building a hospital, the sponsors may build a clinic more suited to their needs.

"The Minnesota State Board of Health has now adopted a policy requiring every applicant to submit a realistic plan for staffing before Hill-Burton money will be allocated," Knudsen said.

During the general discussion, attention was again given to the question of emphasis in the Hill-Burton program. Reference was made to the statistics cited by Bugbee that since 29 percent of Hill-Burton funds were allocated to central cities where 33 percent of the population lives, the needs of our large areas have not been disregarded "by any manner of means."

It was emphasized that much credit is due to State agencies for planning their programs in such a way that, while taking care of the peripheral needs, and the needs of rural areas, a good job has been done in the central cities.

While they cautioned that attention should not be directed to the needs of urban areas to

the detriment of rural areas, the conferees agreed that planning is just as important in the large communities as it is in the smaller communities and the problems are just as great in one area as in the other. It was emphasized that one of the greatest strengths of the Hill-Burton program has been central planning for the whole State. Further, that, while the needs of metropolitan areas could be emphasized more and more in future planning, this need probably should be developed jointly by local planning groups with participation and direction on the part of the State Hill-Burton agency. Experience indicates that no one area of a State can and should plan independently of other areas. The conferees agreed that the success of the Hill-Burton program justified the role of a statewide planning agency in any future efforts to meet the hospital and medical facility needs of all segments of the population.

Guide to Venereal Diseases

An unusually well-designed information piece, A Physician's Guide to the Venereal Diseases, has been printed by the preventable and chronic diseases division of the District of Columbia Department of Public Health, which gives its address and telephone number, with the date of publication on the back. The pages are folded horizontally so that each one successively projects enough to provide a ready index to the subjects treated: chancroid, gonorrhea, granuloma inguinale, lymphogranuloma venereum, syphilis (primary, secondary, latent, late, congenital), treatment of penicillin reactions, and interpretation of laboratory findings. The subjects are printed on the projecting margin of the page (see illustration).

The brochure, in addition to explaining diagnostic and therapeutic processes, points out the necessity of joint responsibility of the private physician and the public health department in the control of these diseases and discusses the services and facilities of the department that are available to the private practitioner. The pamphlet was presented in connection with a seminar held in Washington in October 1959 in cooperation with the Public Health Service. It is being distributed on a continuing basis to all physicians in private practice in the District.

Radioactivity in Fresh Vegetables

THE Food and Drug Administration's second report on radioactivity in fresh vegetables finds the amount still well within limits recommended by the National Committee on Radiation Protection and Measurements. The report covered 402 samples collected in the latter half of 1958 and 139 collected in 1959. Specimens included cabbage, cauliflower, celery, beans, broccoli, brussels sprouts, collards, beet tops, lettuce, kale, mustard greens, parsley, potatoes, tomatoes, peppers, spinach, turnip greens, and watercress (table 1).

The highest average total beta radioactivity found for any vegetable so far examined was 6,700 micromicrocuries per kilogram of a sample of spinach. The average for all vegetable samples from all sources was 2,520 micromicrocuries per kilogram. The highest single value of total radioactivity was 56,000 micromicrocuries per kilogram obtained on a sample of spinach from Illinois (table 2). (One micromicrocurie is a radioactivity of an average of 2.2 disintegrations per minute.)

Samples of certain U.S. staple foods are sent by the Food and Drug Administration to the Lamont Geological Observatory for strontium 90 analysis. Strontium 90 contents of vege-

Table 1. Total beta radioactivity[1] of fresh vegetable samples, by product, 1958–59

Vegetable	1958		1959	
	Number of samples	Average micromicrocuries per kilogram	Number of samples	Average micromicrocuries per kilogram
Beans	38	590	4	430
Cabbage	77	500	21	240
Cauliflower, broccoli, and brussels sprouts	44	770	17	160
Celery	61	3, 550	23	4, 100
Greens[2]	8	2, 860	18	1, 550
Lettuce	76	2, 680	29	4, 270
Parsley	3	7, 270	1	4, 270
Potatoes	9	1, 050	3	430
Spinach	60	6, 820	21	6, 360
Tomatoes and peppers	26	190	2	0
Totals and averages	402	2, 450	139	2, 860

[1] Less that due to naturally occurring potassium 40.
[2] Includes kale, collards, turnip greens, sugar beet tops, watercress, and mustard greens.

Table 2. Total beta radioactivity[1] of fresh vegetable samples, by State, 1958–59

State	Number of samples	Micromicrocuries per kilogram	
		Average	Range
Alabama	2	530	0– 1, 070
Arizona	9	430	0– 960
Arkansas	3	11, 030	7, 060–13, 460
California	184	4, 960	0–21, 620
Colorado	61	1, 130	0–11, 710
Delaware	1	360	----------
Florida	21	1, 000	0– 4, 450
Illinois	23	4, 060	0–56, 000
Indiana	9	620	9– 1, 800
Iowa	2	400	50– 750
Kansas	3	330	185– 550
Kentucky	3	1, 430	0– 2, 540
Louisiana	4	220	0– 600
Maine	6	540	50– 1, 250
Maryland	16	1, 650	0– 9, 750
Massachusetts	6	220	41– 360
Michigan	31	370	0– 7, 800
Minnesota	3	0	0– 80
Mississippi	3	1, 120	77– 1, 750
Missouri	10	1, 970	0– 6, 910
Nebraska	5	9	0– 220
New Hampshire	5	150	14– 390
New Jersey	44	1, 160	18–20, 120
New Mexico	9	1, 090	113– 4, 760
New York	28	600	0– 3, 130
North Carolina	9	960	68– 7, 300
Ohio	21	540	0– 2, 250
Oklahoma	1	140	----------
Oregon	5	550	185– 1, 300
Pennsylvania	2	520	500– 550
Tennessee	7	2, 750	297– 5, 960
Texas	6	170	0– 510
Utah	1	280	----------
Virginia	26	2, 000	0– 5, 860
Washington	9	700	0– 2, 710
West Virginia	6	120	0– 370
Wisconsin	3	0	0– 45

[1] Less that due to naturally occurring potassium 40.

Table 3. Strontium 90 content of fresh vegetable samples, by State, 1958–59 [1]

Product	State of origin	Total beta radioactivity [2] in micromicrocuries per kilogram	Strontium 90	
			Micromicrocuries per kilogram	Percent of total beta
Cabbage	California	[3]	2.0	
Cabbage	California	910	5.1	0.55
Celery	California	4,180	3.4	.08
Celery	California	4,670	3.4	.07
Lettuce	California	1,840	17	.92
Lettuce	California	3,910	5.4	.14
Lettuce	California	6,490	14	.22
Potatoes	California	[3]	.5	
Cabbage	Ohio	[3]	7.2	
Potatoes	Ohio	[3]	7.3	
Potatoes	Texas	[3]	3.2	
Cabbage	Minnesota	[3]	8.8	
Cabbage	Illinois	[3]	14	
Potatoes	Illinois	[3]	1.8	
Potatoes	Maryland	[3]	5.1	
Cabbage	Kansas	[3]	6.4	
Potatoes	Kansas	[3]	3.3	

[1] Samples examined by the Lamont Geological Observatory, Palisades, N.Y., under a cooperative Food and Drug Administration-Atomic Energy Commission program.
[2] Less that due to naturally occurring potassium 40.
[3] Not available.

tables so far analyzed for this nuclide ranged from 0.5 micromicrocurie per kilogram for potatoes from California to 16.8 for lettuce also grown in California (table 3). Other States covered in the strontium 90 analyses so far completed include Maryland, Kansas, Ohio, Texas, Minnesota, and Illinois.

The National Committee on Radiation Protection and Measurements has recommended 80 micromicrocuries of strontium 90 per liter of liquid or kilogram of solid food as the maximum permissible level, for human consumption, in the diet over an entire lifetime. These levels may be exceeded by varying amounts for varying periods without causing appreciable harm to the individual.

The Food and Drug Administration pointed out that an additional safety factor is provided by the washing, peeling, and trimming which is a normal part of preparation of vegetables either by the housewife or by the commercial processing plant. However, it is not yet known whether some vegetables have a greater affinity for strontium 90 than others.

Total radioactivity and strontium 90 contents of vegetables examined to date are far below the results reported in August 1959 for alfalfa hay. Average total radioactivity for the hay samples was 27,200 micromicrocuries per kilogram, and strontium 90 content ranged as high as 804 micromicrocuries per kilogram.

Alfalfa hay, however, is primarily animal feed rather than human food and the amount of strontium 90 appearing in milk is considerably less than the amount in the cow's diet.

Of the 14 States from which alfalfa hay was sampled, 13 were included in the vegetable samplings. There was considerable overlapping in the time intervals covered by the samplings. The alfalfa samples in every instance showed significantly higher radioactivity on the average than the vegetable samples from the same States. Ensilage samples were found to contain less total radioactivity than alfalfa hay, but in most instances more than the vegetables from the same State.

Reasons for the differences observed between alfalfa hay, ensilage, and vegetables are not as yet known, but presumably may include such variables as moisture content of the crop, length of growing season, climatic factors, and differences in plant metabolism.

In the Food and Drug Administration survey of human food and animal feeds, the beta

particles are detected by an instrument which determines the presence of beta radioactivity from all elements, including those which occur in fallout, as well as those in nature, such as potassium 40.

In order to measure beta radioactivity values that relate to fallout only, allowance must be made for this ubiquitous species of potassium. All total beta radioactivity values reported in the survey have therefore been adjusted by subtracting an amount attributed to potassium 40.

The significance of a total beta radioactivity value is determined by the age of the sample. A sample may be extremely radioactive immediately after exposure to fresh products of a fission reaction, but within a few days it will lose that proportion of radioactivity produced by short-lived nuclides. With time, the proportion of beta radioactivity due to strontium 90 and cesium 137 increases, while total radioactivity declines. Half the radioactivity of strontium 90 and cesium 137 is discharged in about 30 years.

WHO Fellowships for Foreign Study

At the request of the United States Government, the World Health Organization has provided a limited number of short-term fellowships in 1960 for the "improvement and expansion of health services."

The World Health Organization Fellowship Selection Committee, recently established by Surgeon General Leroy E. Burney, is chaired by Assistant Surgeon General David E. Price. Dr. John Parks, Dr. Fred L. Soper, and Miss Julia Thompson, represent the Association of American Medical Colleges, The American Public Health Association, and the American Nurses Association on the committee.

Applications for fellowships in various branches of public health and allied fields will be considered. Applicants must be engaged in full-time public health or educational work. In making selections, the committee will consider the ability of the individual and the importance of the contribution which his foreign study will make on his return.

Fellowships will pay per diem and transportation and, except in very unusual circumstances, will cover from 2 to 6 months. Employers will be expected to endorse applications and to continue salary payments for the duration of fellowships.

The deadline for the receipt of applications has been extended to March 15, 1960. Further information and application forms may be obtained from Dr. Howard M. Kline, Secretary, World Health Organization Fellowship Selection Committee, Public Health Service, Washington 25, D.C.

Morbidity and Mortality Characteristics of Asian Strain Influenza

TOM D. Y. CHIN, M.D., M.P.H., JOHN F. FOLEY, M.D., IRENE L. DOTO, M.A., CLIFTON R. GRAVELLE, M.S., and JEAN WESTON, A.B.

DURING the fall of 1957 acute respiratory disease occurred in epidemic prevalence in the greater Kansas City area. The clinical and epidemiological picture of illnesses was typical of influenza. The majority were influenza-like, characterized by a sudden onset of fever, headache, malaise, sore throat, coryza, cough, and muscular aching. The outbreak was explosive, disseminated rapidly through the population, and caused high attack rates among persons of all ages. The number of deaths, particularly deaths attributed to pneumonia, increased.

The outbreak was first noted in September 1957 in the southwest section of Kansas City, Mo., where an abrupt rise in absenteeism from respiratory disease was reported from Southwest High School. The disease then appeared in other high schools in the city. The daily rate of absenteeism reported from five high schools during the epidemic period varied from 11 to 38 percent. The usual daily absenteeism had been less than 5 percent. Approximately 4 weeks following the high school outbreaks, a marked rise in absenteeism was reported in the grammar schools. Inquiries made of four elementary schools on October 15 indicated rates of absenteeism ranging from 33 to 67 percent. There was an abnormal incidence of respiratory infections among workers in various industries in Kansas City, with the peak incidence occurring during the middle of October.

Most of the influenza-like illnesses observed during the epidemic period were probably Asian influenza. This assumption was reflected by the results of etiological studies performed on throat washings (or swabs) and on acute and convalescent serums obtained from several groups of patients with influenza-like illnesses. The specimens came from four principal sources: high school students, student nurses seen at the student health service of the University of Kansas Medical Center, patients seen in offices of private physicians, and patients in various Kansas City hospitals.

An influenza virus which was antigenically related to the Asian strain (A2/Japan/305/57) was recovered from 41 of 75 patients (55 percent) by inoculation of throat washings into the amniotic cavity of 12-day-old embryonated eggs. Acute and convalescent serum samples from 18 of 32 patients showed a fourfold or greater rise in hemagglutination-inhibition antibody titers, with the A2/Japan/305/57 strain of virus used as the antigen. Thirty of the 75 patients from whom throat washings were obtained were seen at the student health service where a separate study on influenza was conducted. Twenty-two of them (73 percent) with illnesses diagnosed clinically as influenza

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This study was supported in part by a grant from the Common Cold Foundation to the University of Kansas School of Medicine.

were shown to have had Asian influenza (T. D. Y. Chin and R. A. Jordan, unpublished data).

In addition, lung tissue specimens were obtained at autopsy from 11 patients who had pneumonia. The Asian strain of influenza virus was recovered from eight patients by inoculation of tissue suspension intra-amniotically into embryonated eggs.

The data presented in this report describe the morbidity and mortality observations made during the epidemic. The morbidity study was made on a group of high school students and their families. The mortality observations were limited to the influenza and pneumonia deaths reported in Kansas City, Mo. The data describing the efficacy of immunization with monovalent vaccine (A2/Japan/305/57) in prevention of influenza-like illness have been reported in a separate publication (*1*).

Methods of Study

The morbidity studies were carried out on a group of students of Southwest High School and their families. The school is located in an upper middle-class residential neighborhood in the southwest section of Kansas City. It had an enrollment of 2,123 students attending grades 8–12. Morbidity data were obtained from a questionnaire which was designed to determine the extent of the epidemic in the school and the epidemiological characteristics of influenza occurring in the students and all members of their families. The questionnaire requested the usual identifying data, a family roster, names of the schools children were attending, occurrence of influenza-like illness since August 15, 1957, date of onset and duration of illness, a checklist of symptoms referable to the respiratory system, and a history of vaccination against influenza.

Each student was given a questionnaire to be completed by or under supervision of a parent, and was instructed to return only one completed form per family. The questionnaires were distributed by classroom teachers on October 22, about 1 month after the peak of the epidemic in the school; the completed questionnaires were returned on October 24.

A few families indicated in the questionnaires that influenza-like illness had occurred during the last week of July and the first part of August. Therefore, the rates presented in this paper were based on the influenza-like illnesses reported between July 25 and October 24.

A total of 1,429 forms were returned. After eliminating 45 inadequate or incomplete forms and 29 duplications, the forms completed by 1,355 families formed the basis for the report. The total population was 5,822 persons (an average of 4.3 per family), including 1,577 members (74 percent) of the student body. No information was available about the characteristics of the remaining 26 percent of the students and their families.

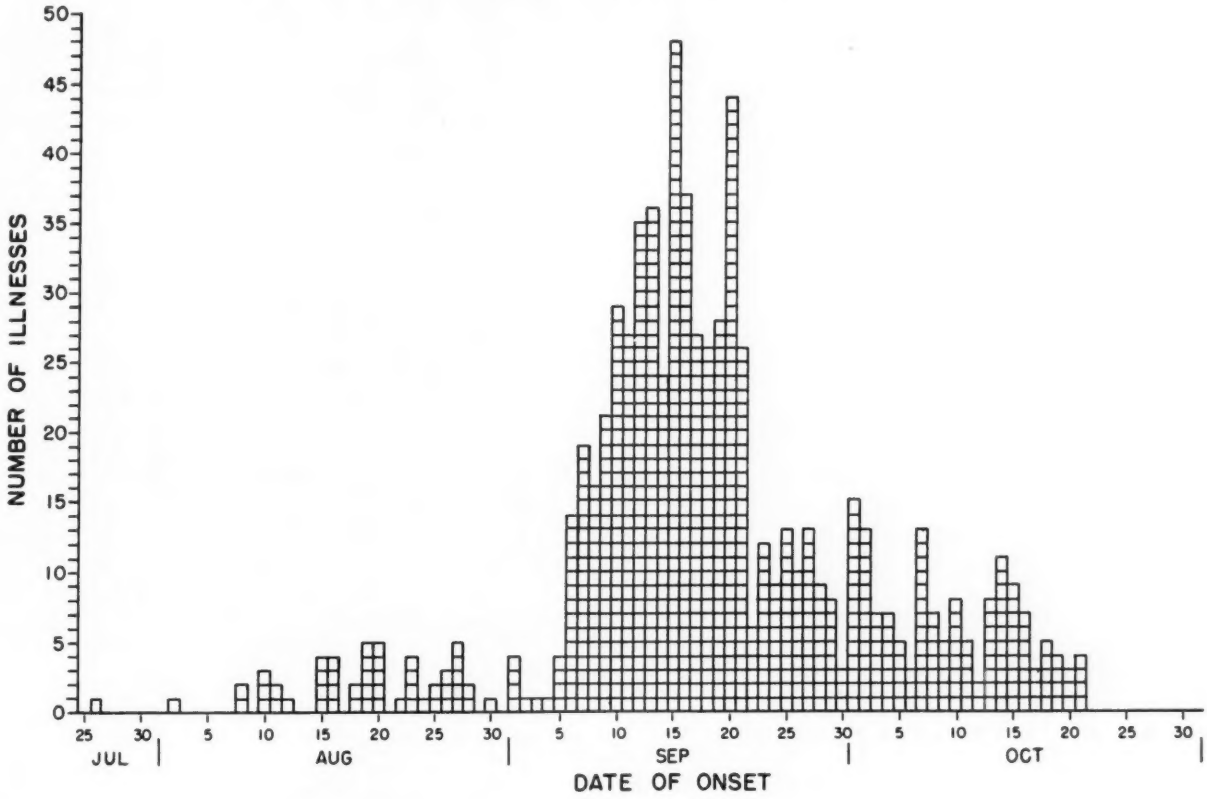
The mortality studies were limited to the reported influenza and pneumonia deaths of residents of Kansas City, Mo., from October 1, 1957, to March 31, 1958. A plan to obtain epidemiological data was organized during the first week of October when a sudden rise in the number of pneumonia deaths was noted. Each week a list of deaths attributed to influenza and pneumonia was obtained from the Kansas City (Mo.) Health Department. For each case epidemiological data were obtained about age, sex, and associations with influenza and with known chronic disease or other conditions, such as pregnancy and postoperative complications. Sources of this information were hospital records and interviews with physicians, relatives, or friends of the deceased. Whenever possible autopsy material consisting of samples of trachea or lung was obtained for virus isolations.

In this study a death was considered related to influenza when one of the following criteria was met: (*a*) symptoms of influenza were present, (*b*) influenza-like illness was present concurrently or within 1 week from date of onset of illness in one or more familial associates of the deceased patient, or (*c*) the Asian strain of influenza virus was recovered from postmortem tissue specimens.

Morbidity Among Students and Families

The general clinical picture of the illnesses of the students and their families consisted of fever of 100° to 104° F., chills, headache, sore throat, malaise, cough, and coryza. Of the

Figure 1. Incidence of influenza-like illness by date of onset in 745 students of Southwest High School, Kansas City, Mo., 1957



1,927 persons reporting having had an influenza-like illness, 84 percent had fever; 73 percent, headache; 77 percent, cough; 63 percent, sore throat; and 61 percent, coryza. A history of chest pain was given by 23 percent. A majority of the illnesses lasted 3–7 days.

The incidence of influenza-like illness (745 cases with date of onset given) reported among the high school students according to date of onset is depicted in figure 1. During August and the first few days of September, there were only sporadic cases. On September 6, the number of cases increased suddenly. The high attack rates were sustained for the next 2 weeks, and then abruptly declined. Although abnormal incidence continued for 3 additional weeks, the number of cases reported were of a much lower order of magnitude.

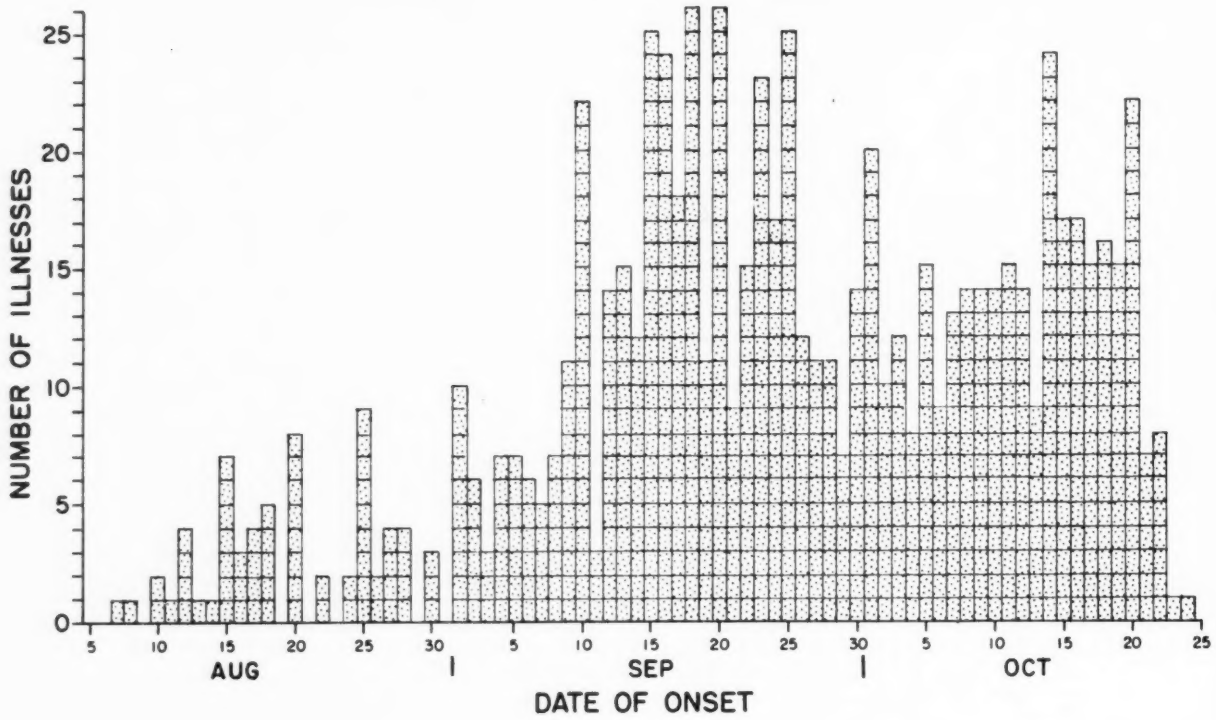
The epidemic curve describing the occurrence of 776 cases among the family contacts for which a date of onset was given (fig. 2) is similar to that of the high school students except that the ascending limb was less abrupt and the peak of the curve was broader. While the incidence in the high school had fallen precipitously by September 21, incidence continued to be high among the family contacts and was sustained until October 20, after which it abruptly declined.

Thirty-four percent of the 5,822 persons had influenza-like illnesses. The highest attack rate, slightly more than 50 percent, was observed in children aged 10–19 years (table 1 and fig. 3). Among children under 10 years of age, about one-third experienced clinical infection. About 27 percent of the young adults gave a history of having had an influenza-like illness, while in persons 40 years and older the incidence was 17 percent. There was no significant difference in the sex distribution.

The age-specific attack rates among the students attending Southwest High School were relatively uniform, ranging from 50 to 69 percent. The overall attack rate in this group was 59 percent.

The incidence of influenza-like illnesses

Figure 2. Incidence of influenza-like illness by date of onset in 776 family contacts of Southwest High School students, Kansas City, Mo., 1957



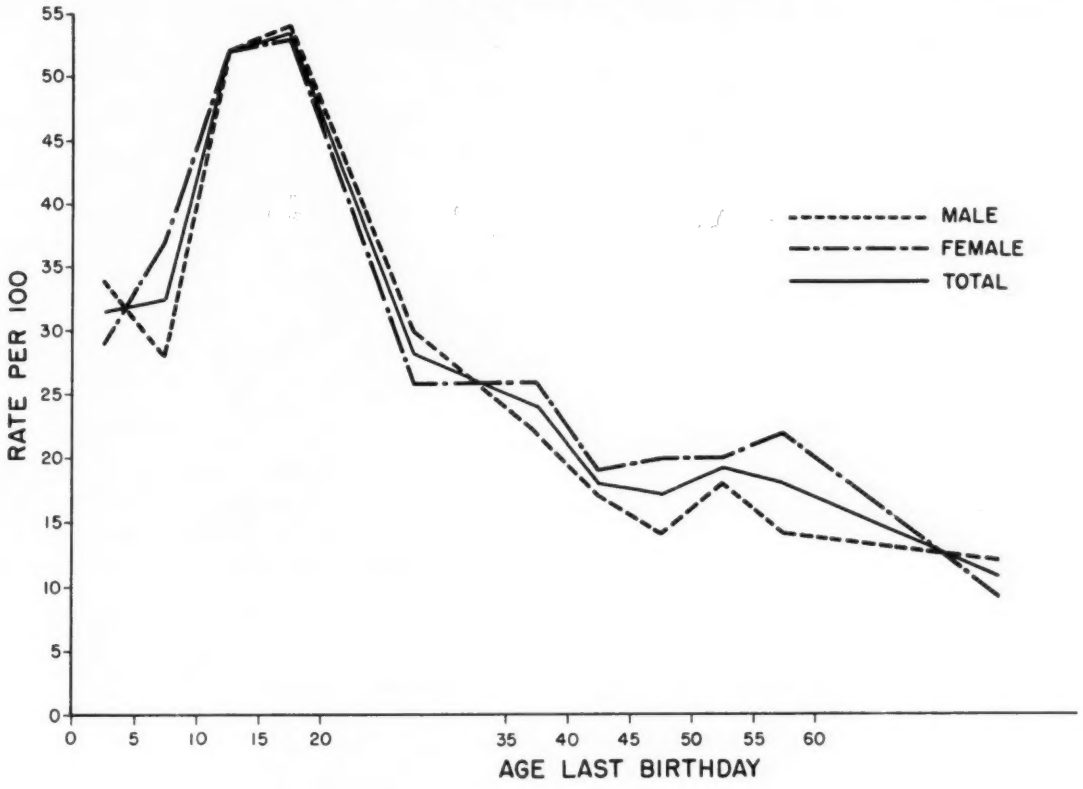
among the family contacts of the students of Southwest High School is summarized in table 2. The overall attack rate was 24 percent. The attack rates among children under 20 years of age were relatively uniform, ranging from 32 to 39 percent and decreasing with age. The rates among the teenage family contacts were considerably lower than those observed in the high school students.

The attack rates with respect to family size are shown in table 3. Of 1,303 families included in this analysis, 85 percent were families with three to five members; the remaining 15 percent had six or more persons per family. The attack rate in three-member households was 30.7 percent; the incidence then gradually increased with family size to 40.5 percent in households having seven or more members per family.

The mean secondary attack rate was 14 percent. This observation was based on 2,596 persons exposed to index cases (first clinical case occurring in a family) in 712 families. The incidence of secondary cases with respect to age is shown in table 4. In calculating these rates, persons who became ill 1–10 days following exposure to index cases were considered secondary cases. As expected, the rates among children were higher than those of adults, with the highest incidence in children aged 10–19 years. The secondary attack rate among children in the age group 10–19 years was slightly higher than that observed in children under 9 years of age; the difference, however, was probably not real, as it could have occurred by chance about 2 out of 10 times ($P=0.23$). The rates among adults in the age groups 20 years and older were substantially lower.

When the distribution of 729 index cases (including 17 co-primary cases) by age was examined, 586 (80 percent) were found to be persons between 10 and 19 years of age. All but nine of these were students attending Southwest High School. As expected, less than 1 percent of the index cases were in children under 5 years. Frequency in age groups 20 years and over ranged from 2 to 4 percent. If index cases were presumed to carry the infection into the household, it appears that in this outbreak the high school students were the most frequent sources of household infections. Unfortu-

Figure 3. Incidence of influenza-like illness by age and sex among 1,355 families, Kansas City, Mo., July 25–October 24, 1957



nately, similar studies were not carried out in an elementary or a junior high school to determine similar relationship.

Influenza and Pneumonia Mortality

The total number of deaths from influenza and pneumonia reported among residents of Kansas City, Mo., from October 1, 1957, to March 31, 1958, was 253, a mortality rate of 49.6 per 100,000 population for the 6-month period. This incidence is compared with that reported for the same period in each of 5 preceding years (table 5). The rate for the fall and winter, 1952–53, was 35.2, about one-third less than that

Table 1. Incidence of influenza-like illness by age and sex among 1,355 families, Southwest High School, Kansas City, Mo., July 25–October 24, 1957

Age group (years)	Total in survey			Attack rates per 100		
	Male	Female	Total	Male	Female	Total
0–4	76	75	151	34	29	32
5–9	203	221	424	28	37	33
10–14	601	619	1, 220	52	52	52
15–19	499	547	1, 046	54	53	54
20–34	87	132	219	30	26	27
35–39	130	302	432	22	26	25
40 and over	931	843	1, 774	16	19	17
Unknown	210	256	[1] 556	13	18	17
Total	2, 737	2, 995	[1] 5, 822	33	34	34

[1] Includes 90 persons concerning whom information on age and sex was incomplete.

Table 2. Incidence of influenza-like illness among family contacts of students of Southwest High School, Kansas City, Mo., July 25–October 24, 1957

Age group (years)	Number of contacts	Number ill	Attack rate per 100
0–4	151	48	32
5–9	424	138	33
10–14 [1]	509	198	39
15–19 [1]	181	69	38
20–34	219	60	27
35–39	432	106	25
40–44	737	134	18
45–49	535	90	17
50–54	280	52	19
55–59	101	17	17
60–90	119	12	10
Unknown	467	73	16
Total	4, 155	997	24

[1] High school students in these age groups were attending schools other than Southwest High School.

reported during the 1957–58 epidemic. In the winter of 1952–53 influenza A′ infections were prevalent in the United States and were known to cause localized outbreaks in Missouri (*2*). During the 4 noninfluenza years, the mortality rates were one-half to one-third as high as those observed during the 1957–58 epidemic.

From October 1957 to March 1958, 7.4 percent of the deaths were attributed to pneumonia and influenza. This figure is significantly higher than that reported for each of the 5 preceding years (table 6). The number of deaths from causes other than pneumonia and influenza was also higher during the 1957–58 epidemic as compared with that of the 4 noninfluenza years.

Table 3. Incidence of influenza-like illness by size of family, Southwest High School, Kansas City, Mo., July 25–October 24, 1957

Size of family [1]	Number of families	Number of persons	Number ill	Attack rate per 100
3	278	834	256	30. 7
4	539	2, 156	693	32. 1
5	293	1, 465	490	33. 4
6	123	738	257	34. 8
7, 8, 9, 10	70	531	215	40. 5
Total	1, 303	5, 724	1, 911	33. 4

[1] 52 families with 1 and 2 members were not included.

The number of influenza and pneumonia deaths reported weekly for 1957–58 was compared with the adjusted average for the period 1952–57 (fig. 4). Two distinct waves of excess mortality were observed during the 1957–58 epidemic, one occurring in October and November and the other in the latter part of February. The 1952–57 curve does not show similar rises although the number of deaths increased slightly late in December and in the month of January; the slight increase undoubtedly represents a normal seasonal variation in deaths from acute respiratory disease.

Table 4. Age-specific secondary attack rates of influenza-like illness among family contacts of index cases in 712 families, Southwest High School, Kansas City, Mo., July 25–October 24, 1957

Age last birthday (years)	Total at risk	Number of secondary cases (1–10 days)	Attack rate per 100
0–4	83	19	22. 9
5–9	232	41	17. 7
10–14	411	89	21. 7
15–19	309	71	23. 0
20–34	109	14	12. 8
35–39	252	37	14. 7
40 and over	981	82	8. 4
Unknown	219	15	6. 8
Total	2, 596	368	14. 2

The age-specific mortality rates based on 253 influenza and pneumonia deaths are shown in table 7. The highest rates were observed in the very young and the very old. The rate among children under 1 year was 529 per 100,000 population. In persons 65 years and older the range was from 185 to 521 per 100,000, with the rates rising as age increased. The age-specific death rates for 1957–58 were generally higher than those for the same period in the preceding 5 years. These differences were particularly noticeable in persons under 1 year of age and in the older age groups.

Although the age-specific death rates of the 1957–58 epidemic were higher in certain age groups, the age pattern of influenza and pneu-

Table 5. Pneumonia and influenza deaths reported in Kansas City, Mo., October through March, 1952–58

Year	Number of deaths	Death rate per 100,000 [1]
1952–53	165	35. 2
1953–54	82	17. 3
1954–55	122	25. 4
1955–56	87	17. 8
1956–57	87	17. 6
1957–58	253	49. 6

[1] Based on population estimates, City Health Department, Kansas City, Mo.

monia deaths was essentially unaltered. The age distribution observed in the 1957 epidemic was almost identical to that of the preceding 5 years (fig. 5).

The number of male deaths was significantly higher than female, 147 compared with 106. The probability of this difference occurring by chance is 1 in 100 when the proportion of males to females in the population is assumed to be equal.

Of the 253 influenza and pneumonia deaths, an adequate clinical history was obtained concerning 237. According to the criteria previously defined, 100 of the 237 deaths (42 percent) were associated with influenza; 80 patients had a history of influenza or an influenza-like illness, and 20 did not have symptoms of influenza but influenza-like illnesses were reported among the familial associates. Of the remaining 137 persons, history of influenza was not elicited as a part of the clinical picture nor was influenza observed among their familial associates.

Table 6. Percentage of deaths attributed to pneumonia and influenza, Kansas City, Mo., October through March, 1952–58

Year	Number of deaths from all causes	Number of pneumonia and influenza deaths	Percent of total
1952–53	3, 329	165	5. 0
1953–54	2, 921	82	2. 8
1954–55	2, 919	122	4. 2
1955–56	2, 450	87	3. 6
1956–57	3, 016	87	2. 9
1957–58	3, 439	253	7. 4

Table 7. Influenza and pneumonia death rates by age, Kansas City, Mo., October through March, 1952–57 and 1957–58

Age group (years)	Average, 1952–57		1957–58	
	Number	Rate per 100,000	Number	Rate per 100,000
0–1	13	153	45	529
1–4	3. 6	11	4	12
5–9	. 4	1	3	10
10–14	. 8	3	1	4
15–19	. 2	1	3	12
20–24	. 4	1	3	8
25–29	0	0	1	2
30–34	. 6	2	0	0
35–39	1. 2	3	4	11
40–44	. 8	2	10	29
45–49	3. 8	12	8	25
50–54	3. 8	13	12	40
55–59	2. 4	9	15	59
60–64	5. 4	25	15	71
65–69	6. 8	39	32	185
70–74	8	71	26	231
75 and over	24	176	71	521
Total	75. 2	16	253	56

In 185 deaths (73 percent) there was a history of pre-existing chronic disease or other associated conditions. Fifty percent of the 185 persons had cardiovascular disease, and about 18 percent chronic pulmonary disease. The conditions associated with the 185 deaths are tabulated.

Associated conditions	*Number of deaths*
Cardiovascular disease	92
Chronic pulmonary disease	33
Nervous and mental disease	15
Diabetes	10
Chronic alcoholism	9
Renal disease	6
Cancer	5
Rheumatism and allied disease	4
Liver disease	3
Lower urinary tract infection	3
Postoperative complication	3
Paget's disease	1
Pregnancy	1
Total	185

Discussion

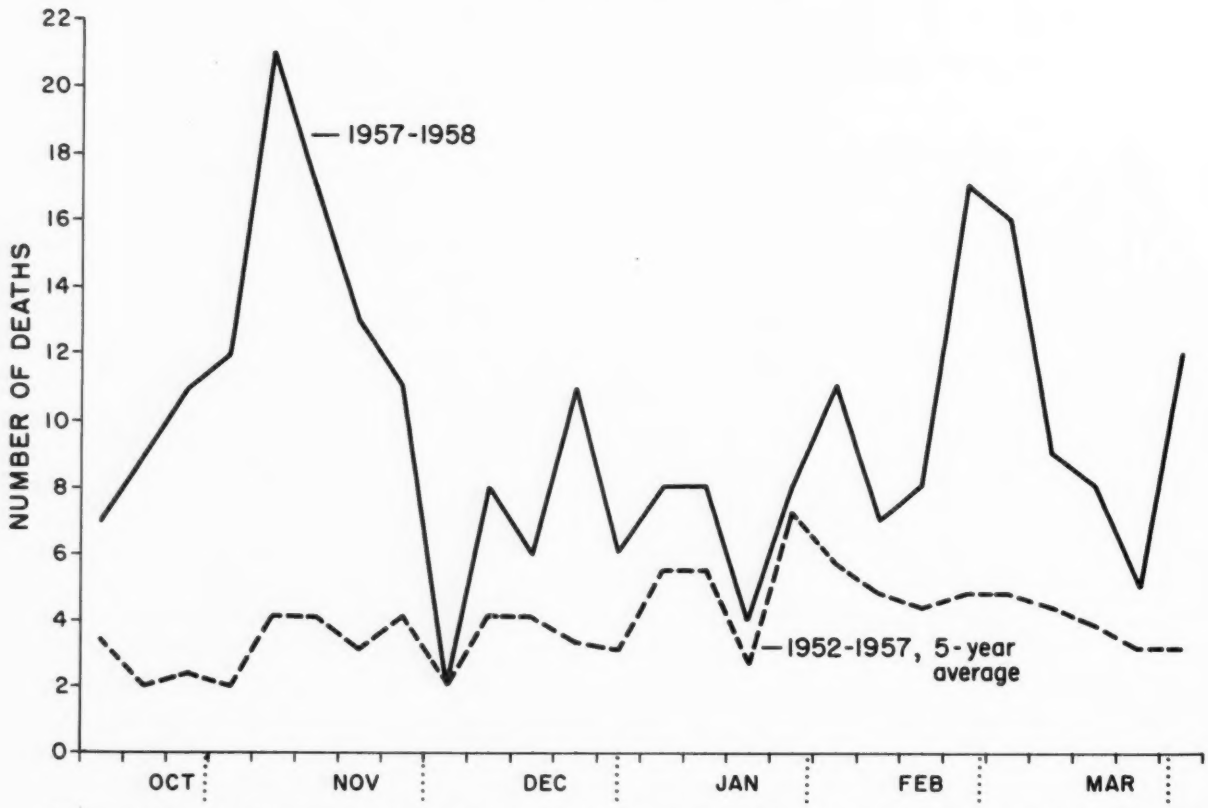
Three main criticisms are immediately evident in this study: (*a*) the questionnaire method of data collection is not as accurate nor as uniform as data obtained by an experienced medi-

cal interviewer, (*b*) the population selected was limited to families with children of high school age, and (*c*) virologic studies were performed on a relatively small sample of cases. Despite these weaknesses, the clinical and epidemiological data derived clearly indicate that the epidemic was influenza and a majority of the illnesses observed during September and October were probably caused by the Asian strain of influenza virus.

The case incidence was high, reflecting the infectiousness of the agent invading a highly susceptible population. The overall morbidity rate of the survey population was 34 percent. The rate among the students attending Southwest High School was considerably higher, however, than that of the teenage household contacts not attending the same school. This observation indicates that the outbreak was centered in the high school and the infection spread to family contacts. This manner of spread undoubtedly explains the high frequency of index cases observed among the Southwest High School students.

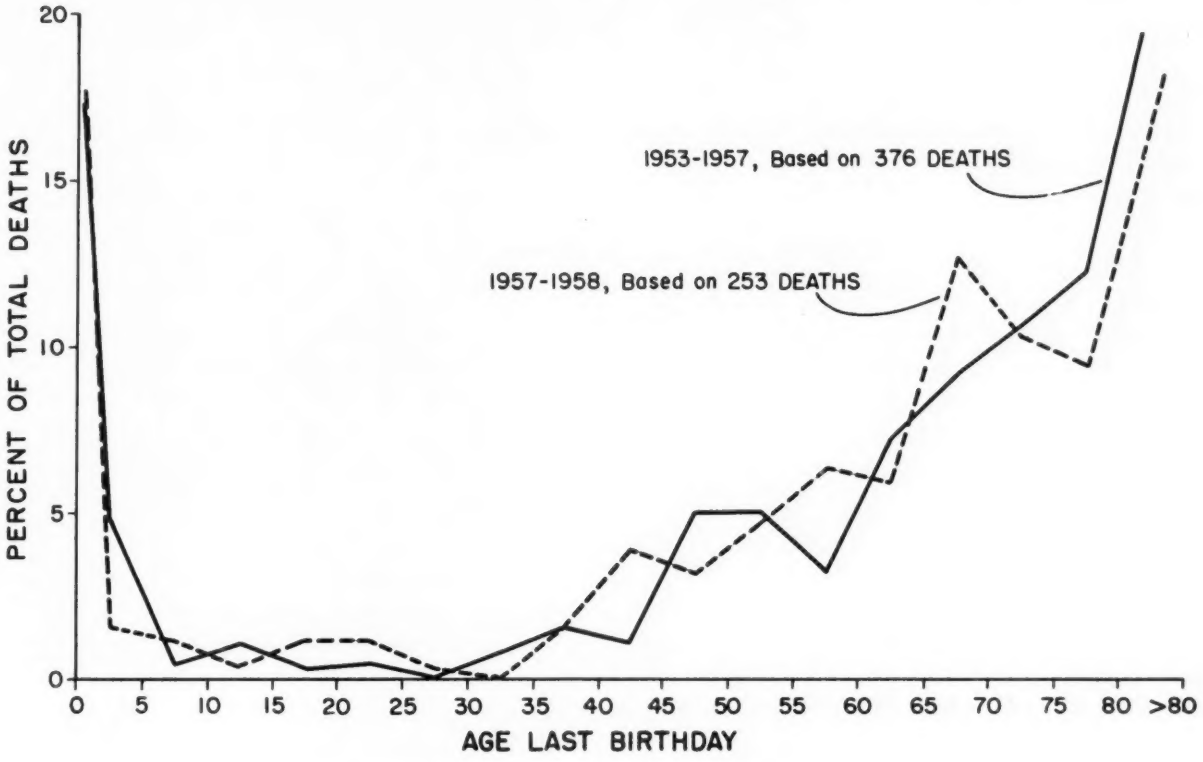
The variations in age-specific incidence are worthy of note. Although the Asian strain showed a marked difference in its antigenic property from all previously known strains of influenza virus and only a small fraction of the older population was shown to possess strain-specific antibody (*3,4*), not all persons were equally susceptible to the disease. The age distribution curve indicates that susceptibility to Asian influenza was greatest among teenagers, with progressive reduction as age increased. This type of age pattern was also reported in studies of Asian influenza in Louisiana (*5*) and in Melbourne, Australia (*6*).

Figure 4. Deaths associated with influenza and pneumonia by week,[1] Kansas City, Mo., October–March, 1957–58 and 1952–57



[1] The method of adjustment used to obtain the weekly average for 1952–57 is that described in the 1957 Morbidity and Mortality Weekly Reports published by the National Office of Vital Statistics, Public Health Service.

Figure 5. Percent distribution by age of influenza and pneumonia deaths, Kansas City, Mo., October–March, 1957–58 and 1953–57



The high attack rate observed among teenagers can be partially explained by the increased risk of exposure, since the epidemic was centered in the high school where more than half of the student body had experienced clinical influenza. The progressive decline in the incidence with increasing age probably is a reflection of partial immunity which was presumably acquired as a result of repeated infections with the influenza virus in the past. Evidence in support of this explanation has been suggested by the work of Francis and associates (*7*, *8*) who demonstrated a high degree of correlation between progressive increase in resistance to influenza and acquisition with age of broader antibody spectrum because of repeated experiences with many antigenic variants of influenza virus. The recent study of Hilleman and associates (*4*) also lends support to this thesis.

Although the attack rate was higher in children aged 10–19 years than in those aged 0–9 years, such age selection was not evident among the family contacts. However, these results are to be expected when children are exposed in a household environment where the degree of exposure becomes more equal. This observation seems to further support the premise that the increased attack rate which occurred among the teenagers was due to the greater risk of exposure in the school.

Two distinct peaks were clearly evident in the mortality curve, one occurring in the fall of 1957 and the other in February 1958. This pattern is similar to that observed elsewhere in the United States (*9*). The first wave of excess mortality was coincident with the sharp outbreak of influenza which occurred during the fall. The second, lesser wave of mortality also occurred during a period of increased prevalence of influenza. Infections in the second period were widely scattered and were limited to single families or small groups of persons such as those in hospital wards or in nursing homes. No survey was made to ascertain the extent of influenza occurring in the community at that time. However, examination of the admission records for respiratory disease at the

student health service of the University of Kansas Medical Center clearly indicates that a lesser, second wave of acute respiratory infections occurred in the month of February and the first part of March. Seventeen (90 percent) of 19 patients studied during this secondary wave were etiologically proved to have had Asian influenza (T. D. Y. Chin and R. A. Jordan, unpublished data).

While the number of pneumonia deaths observed in the current epidemic was significantly higher than that reported for the nonepidemic periods, the age pattern of the deaths was essentially unaltered. The skewed U-shaped curve was similar to that seen in Asian influenza outbreaks occurring elsewhere (*10,11*). There was no indication, however, that it had any resemblance to the pattern of the 1918 experience, when nearly 50 percent of the deaths from influenza and pneumonia were of persons aged 20–40 years (*12*).

Summary

Asian influenza appeared in epidemic prevalence in the greater Kansas City area during the fall of 1957, followed by a minor secondary wave during the winter of 1958. A survey of 5,822 persons during the fall epidemic revealed an attack rate of 34 percent. The highest attack rate was observed in persons aged 10–19 years, with a decline in rates with increasing age.

The rate of clinical infection was related to family size, varying from 30.7 percent in three-member households to 40.5 percent in households with seven or more members. The secondary attack rate was 14 percent.

A total of 253 deaths due to influenza and pneumonia was reported in Kansas City, Mo., from October 1, 1957, to March 31, 1958, a mortality rate of 49.6 per 100,000. This rate was two to three times higher than that of the 4 preceding noninfluenza years.

Two peaks were observed in the mortality curve, one occurring in October and November, and the secondary peak in the latter part of February. The highest death rates were observed in the very young and the very old.

Seventy-three percent of the persons who died had a history of pre-existing chronic disease or other associated conditions, the majority of which were listed as cardiovascular or chronic pulmonary disease.

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Evaluation of Food Sanitation Programs

F. GLENN LYNCH, M.P.H.

THE EVALUATION of programs in many public health endeavors has aroused increasing discussion and interest in recent years. The concepts applied to the evaluation of the restaurant sanitation program of a local health department could, with slight modification, be adapted to a number of other programs.

At least two methods of evaluation must be considered before the equation, input equals output, comes near to being balanced.

In restaurant sanitation programs a realistic objective must be developed and work directed toward that end. When this objective has reasonably been reached, it must be maintained as long as it has public health meaning. Going through the motions of inspecting restaurants year after year with no realistic objectives is not only wasteful but nonprofessional. When a public health program or procedure becomes traditional and has lost its public health significance, it is past time for a thorough reappraisal. New objectives and new methods of accomplishing these objectives must be set forth.

The first method of evaluation, which will be merely mentioned, is cost versus value received. Restaurant sanitation programs cost dollars. Health officers, sanitarians, and others interested in fiscal management must eventually place a value in dollars not only on restaurant sanitation programs but on many other public health services. Programs may be altered and adjusted so that maximum value and acceptable standards can be achieved with a minimum of expenditure.

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The second method of evaluation is to devise a means of measuring programs or achievements. Not many years ago, restaurant sanitation programs were loosely organized with little if any system and no professional objective. In general, the policy was to inspect restaurants when there was time and then try to get the owners to comply with the law.

If restaurant sanitation is to be approached in a professional manner, the sanitarian must not visit a restaurant, tell the proprietor that this or that needs correction, and walk out, only to return at some undetermined future date and, parrotlike, go through the same motions again.

In all scientific approaches the coarser measurements are made first. Most sanitarians have measured restaurant sanitation activities; for example, number of inspections, rechecks, and visits. These measurements are crude and perhaps served a purpose in years past, but do they really tell anything? In a certain district there were 46 restaurant inspections during the month. The exact number of restaurant inspections made in a specific district is meaningless unless the only purpose is to justify the time devoted to them. The time spent and the number of restaurants visited must somehow be related to accomplishment if this number is to have any meaning. If a sanitarian were to list his accomplishments during 1 month, it would have more significance.

There are two methods for establishing a baseline for a program and making subsequent measurements of progress. The first is a professional evaluation by an outside source, using a standardized scoring system, and the second is a self-appraisal based on the same standardized method.

An appraisal by an outside agency may be opposed by a few who have something to hide,

but more probably would be opposed by those who feel insecure about their activities. Such verbal reactions to an outside appraisal as, "My sanitarians and I know just as much about restaurant sanitation as they do," and "We don't need anyone to tell us anything," reflect a defensive attitude of sanitarians and directors of sanitation. They feel their competence and integrity are being threatened.

Their nonverbal thinking might be expressed as: "I am really afraid they will find the situation is not very good." "Maybe they will comment to the health officer that I am not doing a good job." "Perhaps State funds will be held back because of a substandard program." "Information may be given to the newspapers."

Attorneys, engineers, and physicians often call on consultants for advice and assistance without loss of professional integrity. Sanitarians can also do so in order to utilize collective knowledge to do the best possible work for their community.

Many sanitarians find restaurant inspections nonproductive and derive no satisfaction, personal or otherwise, in routine repetitious activity with no measurable success. Until their basic insecurity about the value of a program is replaced by confidence and they receive some degree of satisfaction from their work, their efforts will not be truly productive. What can result from an outside evaluation is illustrated by the experience of the restaurant sanitation program of the Berkeley Department of Public Health.

Evaluation Surveys

In 1954 the city health department requested that the California State Department of Public Health evaluate the sanitary standards maintained by the eating and drinking establishments of the community.

The State health department team that conducted the survey was particularly conscious of the subjective nature of this type of evaluation. Every effort was made to standardize their procedure and to make their approach to the evaluation process as objective and uniform as possible. In many practice scorings and duplicate scorings, the team increased its objectivity, and scorings by its members varied only slightly. It is difficult to be objective in this type of an evaluation; however, a survey appears, and has been substantially proven to be, the most objective way to evaluate programs such as restaurant sanitation.

Berkeley has had a restaurant sanitation program since the early twenties. In the survey of 1954 Berkeley had a mean score of 72.8. Neither in 1954 nor in subsequent studies was Berkeley's score compared with that of other communities which received a similar evaluation.

Evaluations using the same yardstick were performed in 1955 and 1956. The 1955 mean score was 73.7, and 1956, 73.1.

Following the 1956 evaluation it was decided that a change in program policies was indicated. At that time sanitarians lacked enthusiasm for the program, considering it more of a chore than a challenge. Two questions to be decided were: first, were the sanitary standards being maintained in the community satisfactory, and second, was the health department to continue a program which lacked vitality and was time consuming.

The scores in 1954, 1955, and 1956 indicated that no strides forward were being made although such variables as number of restaurants, size of sanitation staff, and effort expended remained almost constant. Perhaps if nothing were done, the score would remain the same. Without any supervision at all, some restaurants will maintain high standards, some, low standards, and the majority will be mediocre.

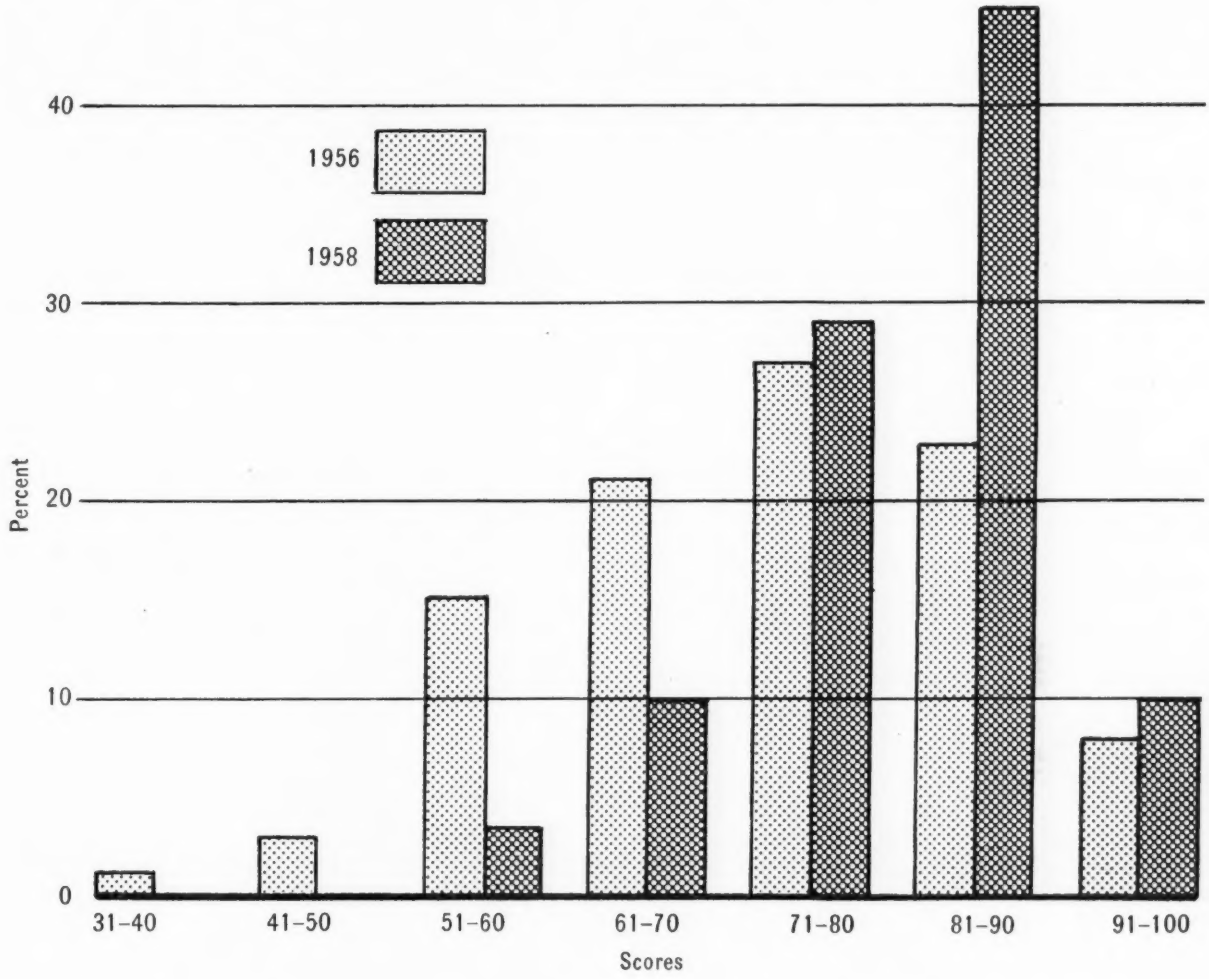
The question of why other programs, particularly housing, were approached with more enthusiasm and vitality than the restaurant program was answered. In housing, sanitarians had the ego-satisfying experience of success, of accomplishing something worthwhile. This was totally lacking in the food program.

Changes in Policy and Procedures

A number of staff meetings were devoted to revitalizing restaurant sanitation activities in 1956. These meetings brought about many changes in policy and procedure.

The system of keeping records was changed. In the separate folder kept on each restaurant, a record of all contacts between the health department and the establishment is filed chrono-

Figure 1. Distribution of scores of eating and drinking establishments, Berkeley, Calif., 1956 and 1958 surveys



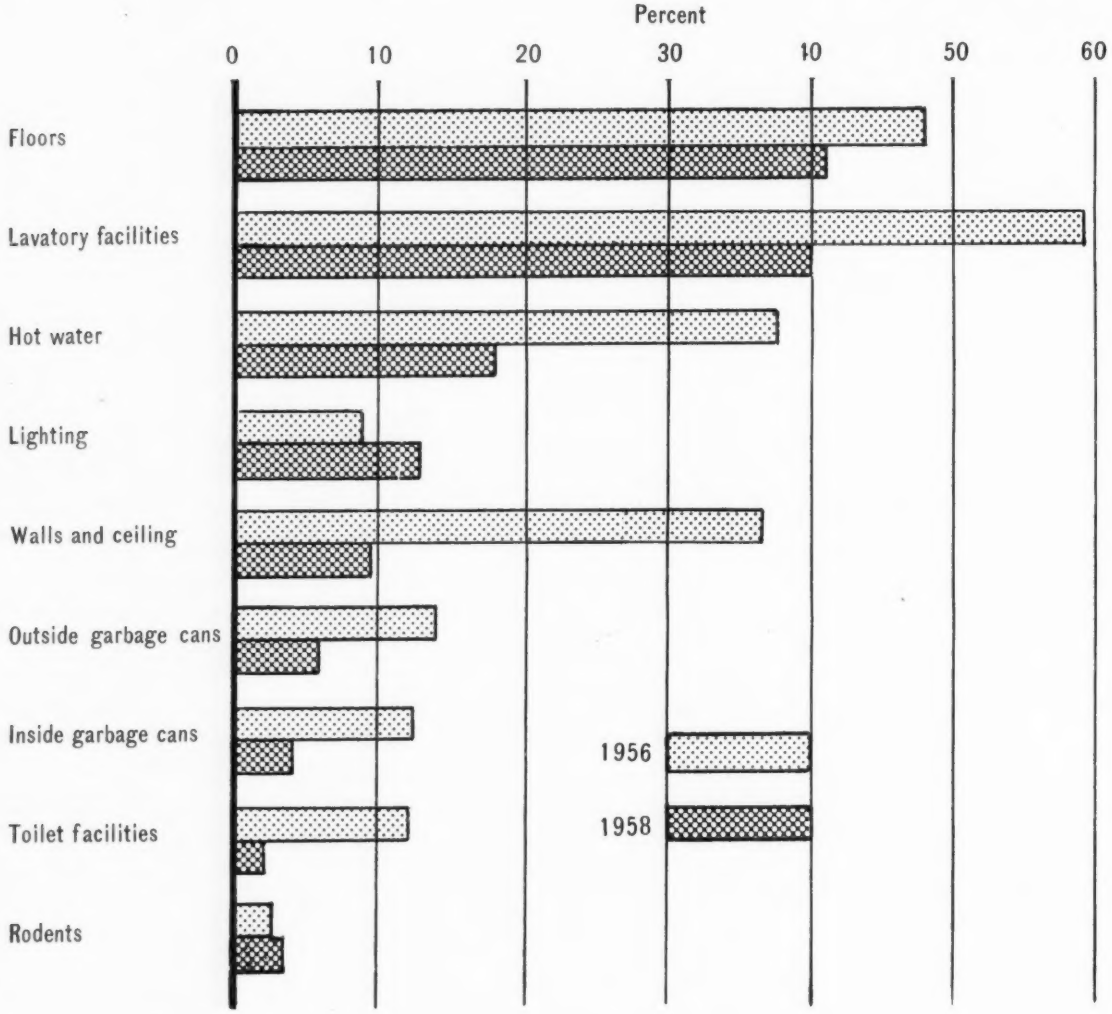
logically. The contents include not only the routine inspection forms but also entries of revisits, rechecks, telephone conversations, letters, complaints, or other communications such as commitments, compromises, or mandates.

When an inspection is made it is thorough and complete. The old, and in some localities perhaps, still common practice of noting only a few items had created a great deal of confusion and inefficiency. This practice was based on the idea that if one were to stress all of the deficiencies at one time, restaurant owners might be overwhelmed, and nothing would be accomplished. This has proved to be a false and damaging concept. At present, the proprietor is approached on a strictly business-like basis, all the deficiencies are pointed out, and new deficiencies noted as they occur.

Previously, when a sanitarian inspected a restaurant for the first time and informed the owner of several violations, he was often told that his predecessor had been coming in for 2 years and never mentioned them. By presenting an incomplete report, a sanitarian is not only being unfair to the proprietor, but also to his department and colleagues. The proprietor concludes that everything which is in violation has been noted and all else is satisfactory.

In cases which must be prosecuted, the importance of complete, thorough, and accurate records cannot be overemphasized. The reluctance of the district attorney's office to prosecute is understandable if the record is vague, indefinite, and nonspecific. Such records serve absolutely no useful purpose.

Figure 2. Comparison of selected physical defects in eating and drinking establishments, Berkeley, Calif., 1956 and 1958 surveys



Also poor notes and records make it difficult for another sanitarian to take up the relationship established by his predecessor at precisely the point at which it had been dropped.

Many sanitarians, new to the department, to the district, or even new to public health, insist on starting a completely new relationship with the proprietor and completely ignore previous contacts. The only conclusion that can be drawn from such an approach is that the predecessor's judgment was not trusted. This is an extremely wasteful, time-consuming procedure.

Also, a successor can pursue an objective for a particular restaurant once it has been established after a complete inspection that has been accurately and fully recorded. Once the objective is reached, the only responsibility remaining is to maintain it.

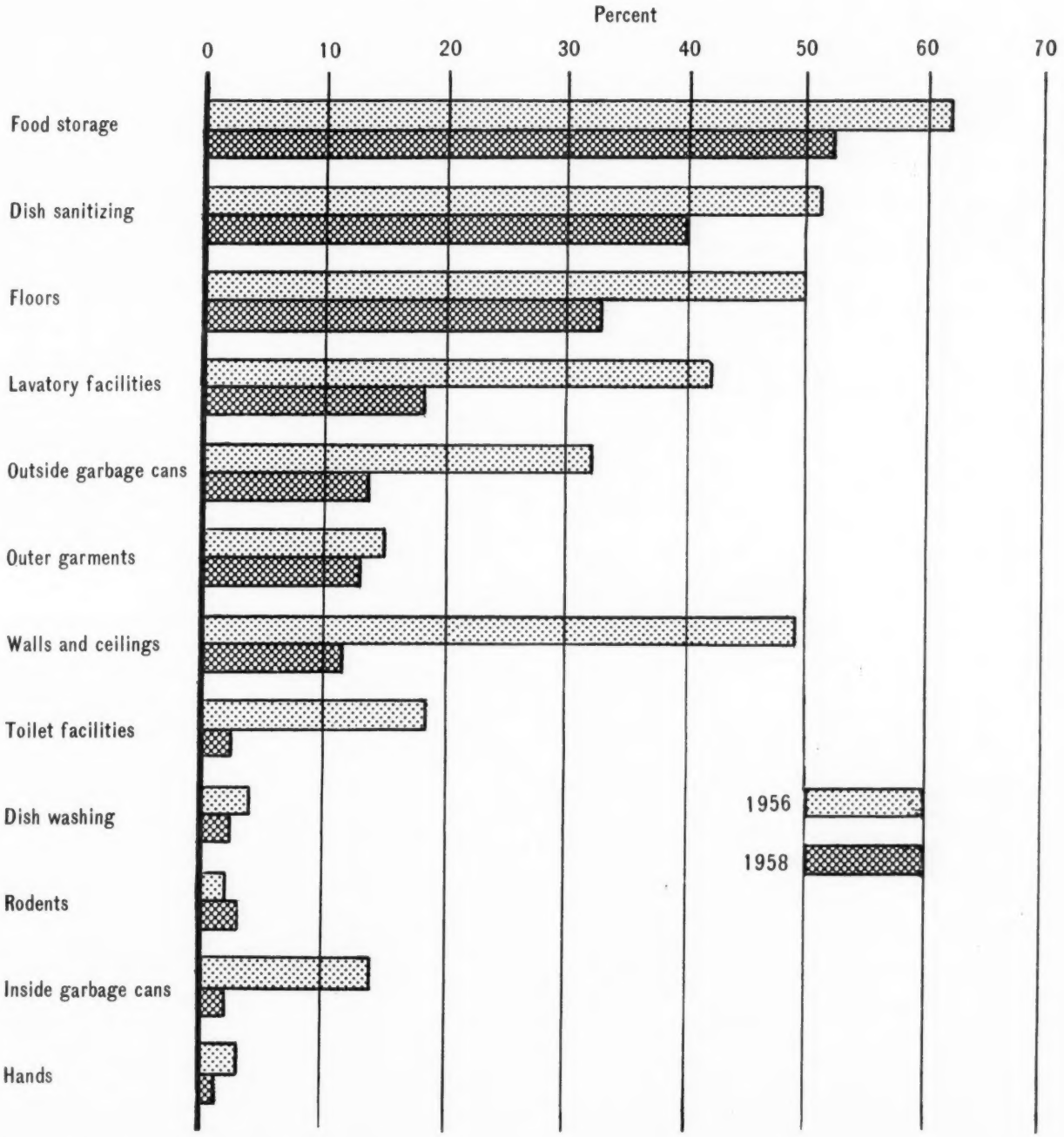
In Berkeley, the public relations value of this businesslike approach has been notable. Sanitarians have reported that compliance is prompt; there is little if any misunderstanding. They have expressed the feeling that as individuals they have gained a greater respect from the businessman.

The followup procedure is extremely important. In the system established in Berkeley the recheck date is marked on a small card which accompanies the folder for each restaurant. The card is placed in a tickler file, and on the date specified it is pulled and the folder and the card given to the person who requested it. Each sanitarian keeps a calendar and sched-

ules rechecks according to other commitments. Each day's workload is scheduled and planned in advance.

The frequency of inspections is another item which has been drastically changed as a result of the 1956 evaluation survey. After the survey it was agreed that inspections be made every 2 months, or more frequently if necessary. This step proved effective in getting the present program underway. It is felt now that the frequency of inspection can be left entirely to the discretion of the sanitarian. However, it was thought desirable that at least two inspections per year be made of those places receiving a minimum amount of service, the restaurants which consistently maintain high standards.

Figure 3. Comparison of selected operational defects in eating and drinking establishments, Berkeley, Calif., 1956 and 1958 surveys



These would be made to assure that previously noted high standards are continued, and also to keep sanitarians thoroughly familiar with the operation of each restaurant. The sanitarian is otherwise free to schedule inspections as he sees fit, permitting him to concentrate his efforts where they will be most productive, in the establishments with low scores in the survey. With these changes the program picked up momentum and interest was created. In December 1957, a little more than a year later, a request to the State was made for study of the restaurant program. As a part of this study, policy, local codes, frequency of inspections, supervision, records, and other items were discussed.

Those who conducted the study offered many interesting and pertinent comments which were brought to the attention of the staff. Those suggestions thought to be most important were incorporated into the program.

In September 1958, 2 years after the previous evaluation, the restaurant sanitation program was resurveyed, using the same yardstick and the same objective approach described earlier. Berkeley's mean score was 82.9, or an increase of almost 10 points (fig. 1).

Berkeley has established as an objective a mean score of 85. Once this goal is reached, it will become necessary only to maintain the status, which, theoretically, will require less effort than that required to raise it to this level.

Rough calculations indicate that this objective has now been reached, and any additional effort would result in diminishing returns. Berkeley has reached the practical maximum of achievement, and sanitarians can now devote the man-hours of time saved to other challenges of environmental health.

The survey was of particular value because it pointed out areas of emphasis rather dramatically. For example, the 1958 survey showed that 51.2 percent of the Berkeley restaurants lost points because of poor food storage methods, an operational defect, and 41.9 percent lost points because of poor floors, a physical defect. On the other hand, it was found that rodents and insects were an operational problem in only 2.3 percent of the establishments, and only 1.2 percent lost points because of poor ventilation (figs. 2 and 3).

Although areas of emphasis would vary from department to department, these examples indicate what evaluation can mean in program planning. For sanitarians in Berkeley to spend a great deal of time on ventilation or rodent and insect problems would not be warranted. They must devote their efforts to instruction on good food storage methods and insistence on well-constructed floors.

Summary

Evaluations are essential to efficient planning in food sanitation programs. At least two methods of evaluation should be considered: first, cost versus value received, and second, a means of measuring achievement as progress toward a predetermined objective. Both cost and performance are necessary ingredients in making a meaningful evaluation.

There are many personal and emotional factors which affect evaluation. If responsibility for restaurant sanitation is to be a meaningful public health activity, it must be approached in a professional manner. An objective, and the present position in relation to the objective, must be established.

An appraisal by an outside agency, technically competent to critically evaluate a program and to measure achievement, is one method of accomplishing a portion of an evaluation. Evaluation can improve service to the restaurant industry of a community and add enthusiasm and prestige to the local health department's program.

The Radiological Health Program in Rensselaer County, N.Y.

LOUIS J. LANZILLO, B.S.

AVOID all unnecessary ionizing radiation. With this the objective, the Rensselaer County Health Department in New York State developed over the past 4 years a modest but effective radiological health program. Accomplishment of the objective is attempted by providing advice, guidance, and technical service in the use of ionizing radiation sources.

New York State became actively concerned with the health and safety aspects of ionizing radiation as a result of waste disposition problems of the early Atomic Energy Commission installations in the State. In 1952, the State health and labor departments took a census of shoe-fitting fluoroscopes. Under the then existing regulation 2 of chapter IX of the State Sanitary Code a program was initiated for controlling the specific hazards associated with the use of these machines. (As of July 1, 1958, the New York State Health Department outlawed the use of the shoe-fitting fluoroscope by unlicensed practitioners.) Both departments then appointed committees of experts to assist them in a study of the entire radiation problem in New York State. The State health department's Advisory Committee concluded that there was a significant and steadily increasing radiation problem in the State and that the health department should prepare to meet this situation. This culminated in June 1954 with the preparation and acceptance by the commissioner of health of a program plan for radiological health. The objectives of this plan were education and training, regulation of radiation exposure, enforcement of laws and regulations, and research.

A radiological health section was subsequently established in the State department's bureau of environmental sanitation, and chapter XVI was added to the Sanitary Code, effective September 1, 1955, as the basis for a program of inspection, education, and correction. Chapter XVI is intended to control the "location or facility where radiation equipment is used or where radioactive material is produced, transported, stored, or used for any purpose." The regulations cover registration of radiation installations with the health officer having jurisdiction, definitions, construction, maintenance and operation, maximum permissible doses, personnel protection, medical examinations, patient protection, disposal of radioactive wastes, radiation instruments, handling of cadavers, monitoring of radiation installations, therapy rooms, warning signs, accounting for radioactive materials, radiation illnesses, injuries, emergencies, accidents, electrical hazards, vacated premises, and limitations on application of radiation to humans.

The interest of the Rensselaer County Health Department in radiation hazards was aroused

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early in 1956. The department at that time had no personnel trained in this new field, but the staff was able to keep abreast of developments by the division of environmental hygiene's in-service training conferences and by consultation with the radiological health section of the State health department.

Using for a mailing list the county health department inventory, which was incorporated in the State census, letters went to the operators of every shoe-fitting fluoroscope in the county alerting them to the hazards. Also, a letter was sent to all operators of dental X-ray equipment urging them to see that their units had filters with the equivalent filtration effect of 2 mm. of aluminum. Filters were obtainable at a local dental supply house.

In the latter part of 1956, the county health department sanitarian was given training in the mechanics and theory of radiation management by inspecting medical, dental, and veterinary X-ray equipment in the county jointly with a member of the State radiological health staff. The reports on these inspections were reviewed with State radiation officials. Since the county health department had no equipment for monitoring radiations, it had to use the State's equipment when available.

Early in 1957 the county health department requested an appropriation to purchase monitoring equipment. Denial of the request delayed implementation of the radiological program.

During this temporary delay, the department concentrated on personnel training. Courses in basic radiation physics and radiological health survey methods were provided by the radiological health training staffs of the Public Health Service and the Atomic Energy Commission at the University of Rochester and elsewhere, in cooperation with the State health department. These courses were attended by the sanitarian, who was to become the supervisor of the radiological control program, and the director of the division. A course on sanitary engineering aspects of nuclear energy was held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, and was attended by the director of the division of environmental hygiene.

Later that year, through the efforts of the county health officer and the director of the division of environmental hygiene, a special appropriation was granted to purchase the following basic monitoring equipment: an ionization chamber "cutie pie," a Geiger survey meter, six direct-reading pocket dosimeters of varying ranges, a dosimeter charging unit, a micrometer caliper, and a stopwatch. The cost of this equipment was approximately $817.

Program Elements

The responsibility for implementing the radiological health program was assigned to a sanitarian in the environmental hygiene division in addition to his other duties.

The first major undertaking was to determine where and in what quantities radiation was being used in the county. Registration of all sources of radiation with the local health department is required by chapter XVI of the State Sanitary Code. In Rensselaer County 52 operators voluntarily registered their installation following a press release by the State health department. It was suspected, however, that this number represented only a fraction of the sources of radiation.

To expedite registration, tearoff return postcards were sent to all other physicians, dentists, veterinarians, podiatrists, and osteopaths asking if they used X-ray equipment or radioactive materials. The list was assembled from the yellow pages of the telephone directory. A followup by telephone was made on those who did not reply, although the postcard reminder was relatively successful.

The survey revealed 111 installations of X-ray equipment as shown below. In addition, one hospital, one university, and one laboratory reported installations using radioactive materials.

Source	*Number of X-ray installations*	*Number of machines*
Medical	39	52[1]
Dental	60	61
Veterinarian	5	5
Research	2	5
Other	5	5

[1] Includes 3 used for therapy.

Next, a letter was sent to operators whose installations were not registered asking them to register their equipment or materials immedi-

ately. To date, a total of 109 of the 111 operators have registered their radiation equipment. A few operators requested, and were given assistance in filling out the form.

Following the postcard survey and registration, a simple visible card file was set up on all radiation installations. Information on the card includes name of the installation, location, operator in charge, type of equipment, whether or not registered, and date of last inspection. The status of the installation is indicated by a colored tab to denote whether the installation was satisfactory or unsatisfactory.

Field investigations were the second major activity. Those undertaken at the beginning of the program were limited to shoe-fitting fluoroscopes, prohibited since July 1, 1958, dental units, and portable medical radiographic units. Field experience gained in company with the State personnel and the consultation service available from them and the division director helped build up the confidence of the supervisor. As confidence increased, activities were gradually broadened to include detailed investigations of X-ray departments in hospitals and laboratories.

An important adjunct of the field investigations is the education of the professional users of radiation sources to the significance of ionizing radiations, procedures for reducing radiation hazards, and application of improved techniques.

To assist users of dental X-ray equipment, the health department staff did some research in dental radiography, resulting in a suggested technique in which maximum protection from ionizing radiation will be provided, under the most practical conditions, for all persons concerned. X-ray procedures are patterned so that the operator is never in the direct path of "useful" beam for primary protection and his position utilizes distance and any available barrier for secondary scatter protection.

The procedure suggests: (*a*) the provision of a swivel armchair, similar to an executive-type chair, with an attached headrest, for use in X-raying the patient, (*b*) the location of the swivel chair near the X-ray unit, but, more important, against a wall in the room that faces an unoccupied area—the X-ray tube placed in line with the chair so that all X-ray exposures are directed toward the chair which, to repeat, is located against the wall facing an unoccupied area, and (*c*) placement of the patient in the chair in any position desired because of the mobility of the chair. In a full-mouth series the operator can merely adjust the patient to the restricted direction of the X-ray tube and take the necessary exposures. This technique of positioning will prevent the operator from ever being in the direct path of primary beam. The operator must then assume a position as far as possible from the tube and patient and utilize any barrier in the room such as a wall or door for maximum protection from stray radiation.

Currently, the program is being expanded to include the safe management of radionuclides. The program supervisor attended a training course on hazards of radionuclides at the University of Rochester in 1958. He has also observed a representative of the Atomic Energy Commission on inspections of installations in Rensselaer County authorized to use radionuclides. This training has developed the program supervisor's familiarity with the uses of radionuclides in hospitals and laboratory research and the hazards associated with these materials. The use of radium in medical offices has not presented a problem in Rensselaer County because the survey revealed no authorized users.

Inservice training of the health department personnel in radiological health work continued as the program progressed. A particularly valuable course arranged by the New York State Health Department training section was given in a radiation workshop at the University of Rochester in November 1958. The session offered an opportunity for exchange of ideas and discussion of local experiences by those directly engaged in fieldwork in radiation control. Other such workshops are expected to be sponsored in various areas by the State health department.

Program Implementation

In the field investigations, about every type of X-ray machine that might be used in medical, dental, or veterinary practice has been encountered. Poor technique, insufficient filtration, or lack of cones were commonly found

in the installations. Some of the hazards associated with these units and the protective measures suggested follow.

Radiographic Units

A few old radiographic units with glass unshielded tubes are still in use by physicians and dentists. The department has been successful in discouraging the use of two such units. One dentist is buying a new 90–kv. unit, and another is having his X-ray work done by someone else.

One of the most common defects was the lack of adequate filters for the primary beam. The State Sanitary Code requires a total filtration equivalent to at least 2 mm. of aluminum. The filter absorbs the soft, less penetrating radiations, thereby protecting the patient from these dangerous rays. It eliminates scatter haze on film, and appreciably reduces stray radiation. This amount of filtration will not require an increase in the exposure factors to achieve a satisfactory film.

There was a conspicuous absence also of diaphragms or cones for collimating the useful beam. In some installations the collimating device was oversized. A diaphragm or cone of correct size in the useful beam serves to limit the size of the radiated area to that which is clinically necessary. For dental X-rays, the collimation should be adjusted so the patient is exposed to a beam no greater than 3 inches in diameter in order to protect the patient's eyes.

In conventional chest X-rays, operators were encouraged to protect patients from scatter radiation by draping an apron of one-half millimeter lead equivalent below the front of the cassette as an adjunct to close coning.

Frequently advice was provided for improving radiographic operational safety. In many instances the operator customarily stood either adjacent or close to the equipment, and sometimes directly in the path of the primary beam. For maximum protection from primary and stray radiation, operators are advised to stand as far as possible from the tube and the patient during an exposure. An extension cord on the timer button enables the operator to stand in an adjoining room or at least behind a shield. Operators were also informed that it is no longer necessary to use film requiring long exposure. They were advised that modern fast film permits shorter exposures, thus reducing the dose to the patient and the stray radiation to the operator. The shorter exposure time also saves wear and tear on the unit.

When a dentist is contemplating purchase of a new X-ray film unit, the 90-kilovoltage unit should be considered in place of units operating at 45–70 kv., because the exposure time is reduced from the usual 1.5 seconds to 0.5 second. An 18-inch focal distance from the skin with a long lead cone device (15 inches) and 3 mm. of aluminum for filtration purposes will cut down skin exposure and reduce gonadal dose considerably.

Fluoroscopic Units

Diaphragm shutters and tubes of fluoroscopic units were often found off center from the viewing screen. Under these conditions, the useful beam extended beyond the fluoroscopic screen and struck the operator. Centering the beam, of course, was recommended. In addition, operators were told to limit the shutters so that when fully opened there was a visible black margin of at least one-fourth inch around the screen at the maximum working distance from the table. It was also suggested that the smallest possible aperture of fluoroscopic screen be employed during examinations since both the volume dose and the scatter increase more rapidly than the dimensions of the fluoroscopic field.

Fluoroscopic screens frequently were not completely interlocked with the X-ray tube. The screen could be adjusted in various positions so that not all of the primary beam is intercepted by the protective lead glass of the viewing screen. Installation of a pin or hinge between the screen and screen frame was advised to provide an interlock with the tube.

As with radiographic units, absence of adequate aluminum filters was also common.

Leaded aprons and gloves in unsafe condition were occasionally found. Protective clothing for the operator and assisting technician are required to be checked periodically by the person responsible for radiation safety. In horizontal fluoroscopy, to assure adequate protection from scatter, it was recommended that an apron of one-fourth millimeter lead equivalent

hang between the patient and the fluoroscopist. This is in addition to a protective apron worn by the operator.

The time required to adapt the eyes to darkness prior to a fluoroscopic examination is particularly irksome to the busy physician. Dark adaption is essential because it permits adequate examination of the patient with the least possible radiation exposure. A dark adaption period of 20 minutes with polaroid glasses was recommended. Improvement continues up to 20 minutes but a minimum of 10 minutes of dark adaption is necessary.

Few fluoroscopic units encountered in the field were provided with a built-in integrating timer, although units installed after September 1, 1955, in New York State are required to have such a device to interrupt the circuit after 4 minutes of exposure. Operators of units installed before that date can satisfy this requirement by purchasing an interval timer, for less than $10, and manually setting the clock for the 4-minute exposure. This control alerts the physician and reduces the possibility of overexposure of the patient.

Sometimes the dosage rate at the table top exceeded the maximum 10 roentgens per minute. This unsatisfactory condition can be corrected by lowering the milliamperage, by adding more filtration at the tube port, or by increasing the distance between the tube target and table panel.

Operators are also advised of the availability of intensifying screens which make it possible to reduce the dose to the patient as well as to the operator.

Blanket Registration

On May 20, 1959, a blanket registration was granted to Rensselaer Polytechnic Institute, one of the leading educational institutions in the State. Blanket registration is the authority for self-policing in compliance with the State health and safety regulations. This is considered the most practical method of accomplishing the objectives of the State Sanitary Code in view of the institution's increasing use of radionuclides and radiation-generating equipment in research and teaching. Special radiation facilities include a subcritical assembly reactor, a Van de Graff proton accelerator, a betatron accelerator, a Cockcroft-Walton accelerator, and several X-ray diffraction units.

As a result of health department recommendations over a period of 3 years, the institution organized a radiological safety committee and appointed a radiological safety officer. A draft of the institution's proposed administrative control and radiological protection procedures was submitted to the county and State health departments for review and comment. The final draft, incorporating suggested revisions, was officially approved by the institution April 24, 1959. The procedures are divided into three parts: administrative, general radiological protection, and specific radiological protection. A unique feature is that the last part can be changed at any time without amending the entire document.

The radiological safety officer of the university is empowered to make inspections and impose additional requirements and emergency measures he deems necessary to maintain high standards of radiological safety. The radiological safety committee is giving considerable attention at present to radioactive wastes. The current plan is to use a commercial waste disposition agency in lieu of a burial area located in the county. Radioactive wastes at the moment, however, are being stored in a shielded storage room at the institute and are periodically monitored by the radiological safety officer.

Approval by the health department is required for the disposition of radioactive wastes by ground burial. Routine monitoring is specified and maximum concentration limitations are established. In the event of fires, accidents, unauthorized entry, thefts or losses, each such instance is to be reported to the radiological safety officer who in turn advises the Rensselaer County health officer. If the radiological safety officer cannot be reached, the county health officer is to be advised. The county radiological health program is geared then to protect the citizens from any unfortunate consequences that might result from the mishandling of radionuclides or radioactive wastes.

Summary

The New York State Department of Health initiated activities in 1952 to control radiation

hazards. The Rensselaer County Health Department is carrying out this program in Rensselaer County.

The program, under the supervision of a trained sanitarian and with the basic monitoring equipment, consists of registration of installations, a visible card file record system, and inspection of radiation equipment. Activity is presently limited to radionuclides and certain other radiation sources, such as accelerators. The staff, however, is continually increasing its working knowledge and competence to carry out better the legislated responsibilities.

Much of the program consists of education in the safety values of shielding, distance, restricted exposure time, coning, filtration, and protective clothing. Although protective means are available, the county health department must work tirelessly to develop safe habits and promote safe facilities among radiation users. To be effective this educational program seeks to stimulate self-discipline.

Rensselaer County's radiological health program has been developed with currently available space and staff and with an expenditure of less than $1,000 for equipment.

This program is another demonstration of the advantages held by a modern county health department employing only qualified professional personnel. Such a department can adjust its activities to provide optimum public health protection in our ever-changing environment.

Kimble Award

The deadline for nominations for the Ninth Kimble Methodology Research Award is June 1, 1960. The award, $1,000 and a silver plaque, is given annually in recognition of the application of scientific knowledge to the public health laboratory.

Candidates must live in the United States, its territories, or Canada. Their work should be either a fundamental contribution which serves as a baseline for development of diagnostic methods within the province of the public health laboratory or the adaptation of a fundamental contribution to make it useful in a diagnostic laboratory.

Authors, their associates, or others may make nominations. Studies with more than one author will be accepted. The nominations must be accompanied by six summaries and a bibliography, also six reprints if available. A statement justifying the recommendation of the work and a letter of transmittal are required. Documentary evidence and related material should not be signed by the nominator. None of the material submitted will be returned.

The Kimble award, established by the Kimble Glass Company of Toledo, Ohio, and sponsored by the Conference of State and Provincial Public Health Laboratory Directors, will be presented at the annual meeting of the conference in San Francisco, Calif., in October 1960.

Send all nominations to: P. R. Edwards, Chairman, Nominating Committee, Kimble Award, Communicable Disease Center, P.O. Box 185, Chamblee, Ga.

United States–Mexico Border Public Health Association

CONFERENCE REPORT

A border 2,000 miles long, crossed 75 million times in the course of a year, gives rise to human relation problems with direct or indirect bearing on the health of communities and the individuals who live in them.

ABRAHAM HORWITZ, M.D.

By interlinking public health planning along their common border, the United States and Mexico have been taking a realistic approach to the fact that disease recognizes no political boundary. The vehicle for their joint health efforts, the United States-Mexico Border Public Health Association, has for more than 17 years attacked issues of common concern through conference discussion and committee studies and has organized integrated action.

The 17th annual meeting of the association held in Brownsville, Tex., and Matamoros, Tamaulipas, Mexico, between March 30 and April 3, 1959, was attended by more than 300 public health workers. Speakers and delegates delineated the scope of public health responsibility, analyzed the interplay of public health and environmental elements, marked out areas for intensified effort, and reported achievements in control and research.

Presiding over the opening plenary session, Dr. Abraham Horwitz, director of the Pan American Sanitary Bureau, World Health Organization Regional Office for the Americas, emphasized that the economic matrix of a society nourishes or stunts the people's health and conversely the degree of progress of a community hinges largely on the abundance of human energy derived from sound health. In extensive parts of the Americas, he said, deficient nutrition and scarce water supply and other unfavorable conditions drain off the lives and energy needed to transform those conditions. Public health techniques must harmonize with all other activities which condition the individual's well-being. Among his other recommendations was the integration of all community public health activities within the local health agency, using the family as the basic unit. Public health workers should be aware, he

believes, of the trend toward pooling the hemisphere's spiritual and material wealth. As a short-run international health aim, he proposed an attack on diseases with strong economic ramifications; long-run goals should focus on creating and expanding local and national health services and training professional personnel.

Recognition of the frontier as "a two-way street" rather than as a barrier, observed Dr. John C. Cutler, Assistant Surgeon General for Program, Public Health Service, is contributing, through the exchange of venereal disease contact data, to control in areas far from the border as well. He urged each health agency and clinic providing services to braceros to function also as a venereal disease control station. After illustrating how venereal disease control activities have pioneered in casefinding and administrative techniques, he pinpointed one of the current challenges as the proportional increase in infectious syphilis among persons under 20 years old.

Another conference highlight was a roundup by Dr. David E. Price, Assistant Surgeon General and chief of the Bureau of State Services, Public Health Service, of health research in the United States during 1958, particularly in cancer chemotherapy, psychopharmacology, new drugs, and studies of viruses in the cause of cancer. Among current and anticipated challenges to public health planners he named staphylococcal strains resistant to antibiotics, shortages of medical personnel, and the negative health facets of urban environment.

For the past 4 years, he observed, there has been no material rise in life expectancy at birth. This expectancy can be increased mainly by maintaining the health and vigor of the growing number of persons of middle age and older.

Dr. Domingo Cervantes Gonzalez and coworkers summarized their activities in the Mexican National Antimalaria Campaign during 1958 in Tamaulipas, Mexico. An account of the construction and development of the Hermoso Valley, Mexico, water system was presented by Alfredo Sahagun Sahagun, the system's manager. During the session, the participants selected Hermosillo, Sonora, for their 1960 meeting.

Following are summaries of selected papers presented at the conference.

Mexican School Hygiene Covers Broad Scope

A function of school hygiene in Mexico, in promoting students' physical, mental, and moral health, is to monitor the environment in and around the school for unwholesome elements, asserted Dr. Manuel Aveleyra Arroyo de Anda, director general of school hygiene, Ministry of Public Education, Mexico City. Hygiene units, he explained, watch the neighborhood for sale of unhygienic foods, inappropriate businesses, and unsafe traffic conditions.

Relating highlights of Mexico's 77-year experience with school hygiene, Aveleyra revealed that Aztec children were taught rigid hygiene practices and were lightly clothed for health and growth. Colonial Mexico had medical inspection of Royal University students and smallpox vaccination, leading to the disease's ultimate eradication. Correctional houses, he said, date from the postindependence era when juvenile delinquency was serious, and a school for deaf-mute children was founded by Emperor Maximilian. A pedagogic-hygienic congress in 1882 produced the scientific, organized application of school hygiene, followed not long after by the setting up of a special unit of medical and hygienic inspection for schools.

School hygiene, stated Aveleyra, aims to promote in students "assimilation of learning, adaptation to the prevailing medium, hygienic habits, and sanitary convictions." Since teachers are basic supports, students of normal schools are screened for the mentally and physically unfit and teaching candidates are periodically checked and provided health services. Throughout their careers, teachers' health is watched; they are given hygiene publications, courses, and lectures. Also, they take active part in routine hygiene work. In schools without hygiene services, they receive instructions for their own health care and pupils' hygiene. All kinds of workers on school premises come under the hygiene program.

Following set norms, pupils are given health education and guidance in psychic and biological development, including medical assistance and rehabilitation. They receive medical-prophylactic examinations and are classified and vaccinated. In 1958, stated Aveleyra, the hy-

giene department examined about 773,000 pupils, of which roughly 154,000 were found with a disease.

Among the activities he described was the 1953 antituberculosis campaign, in which school children sold almost 3 million stamps, thus raising funds to start an antituberculosis dispensary for the schools. In school festivities, such as School Hygiene Week, parents mingle with school personnel and pupils and are exposed to information on hygiene. Home visits are made by committees on school hygiene composed of students elected by classmates, trained by school medical personnel, and supervised by a selected teacher.

Aveleyra mentioned that the work of each school medical zone, comprising schools totaling 4,500 to 5,000 pupils, is planned with flexibility yearly in advance by the department of school hygiene and school authorities.

Encephalitis in Texas Had Economic Impact

The three encephalitis viruses, first found concurrently in south Texas in 1941, have been an important public health challenge there during 3 of the last 5 years. This was mentioned in a brief review of findings on these viruses in Texas by Dr. J. V. Irons, Dr. Richard B. Eads, James E. Grimes, and Thelma D. Sullivan, division of laboratories, Texas State Department of Health. One reason, they said, lies in the relatively abundant water supply in the Lower Rio Grande and extended irrigation of the Texas High Plains area which favored propagation of mosquito vectors. Western and St. Louis encephalitides are most active in Texas; eastern, the least.

Small outbreaks occurred in 1944 and 1952. Then in 1954 an outbreak was followed by 500 cases later that year in Hidalgo County, mainly from western encephalitis. The St. Louis variety predominated in a large 1956 outbreak in the Texas High Plains and caused a lesser one in Cameron County in 1957.

In the Hidalgo and Cameron County outbreaks, illness ranged from numerous subclinical cases to an occasional fatality, affecting all age groups but mostly young-adult and middle-aged men. The economic impact was heavy. They also pointed out the difficulty of differential diagnosis of encephalitis and aseptic meningitis.

RESOLUTIONS

Among the resolutions adopted during the 17th annual meeting of the association were those dealing with:

- more intensive efforts toward control of venereal disease in border cities, including serologic testing of migrant labor, greater use of municipal, State, and Federal resources, and extended training.
- recommendations that infectious syphilis cases be considered medical emergencies, calling for exhaustive epidemiological study and rapid control.
- intensification and expansion of training for border health personnel, including opportunities for observation of conditions and health practices in both countries.
- strengthening health information exchange on both sides of the border.
- for emergency treatment of diarrhea, adequate equipment, physical facilities, and expert personnel, in border health centers.
- possibilities of setting up a scientific committee of experts from both countries to make an epidemiological study of encephalitis along the border and to suggest control measures.

Says Goat Product Output Should Be Industrialized

In large areas of Mexico, the entire goat population may have brucellosis, reported Dr. Alfonso Elizondo of the Rural Cooperative Medical Service in the Mexican Ministry of Health, Mexico City. Rapidity of contagion keeps infection high, he explained, with consequent intensification of health and economic hazards to farmers. Of bovine origin, the disease is under gradual control through pasteurization and livestock vaccination.

Elizondo holds that the only practical way to control *Brucella melitensis* from goats is to remove the animals from farmers' living quarters some distance to communal corrals and to organize on a cooperative basis groups of farmers for animal care and small industrial plants for

making goat products. Not only will this reduce brucellosis from animal contact but that from atmospheric dust as well since goat refuse will be far from farm homes. Industrial handling of goat products will control the disease acquired via food. He pointed out that the plan required organizing communities, finances, product distribution, and utility allocation.

Another control technique he mentioned is goat vaccination with live vaccine, so far successful where adequate facilities for evaluating findings exist, as in Comarca Lagunera.

Rabies in Wildlife Blocks Eradication Elsewhere

Though rabies in dogs has been steadily reduced in border areas, the disease in wildlife during the last 10 years has climbed. This has kept the rate of infection among the Nation's domestic animals almost stationary despite public health measures, stated Dr. Donald Miller, veterinarian in charge of the Animal Disease Eradication Division of the U.S. Department of Agriculture, Phoenix, Ariz.

The menace to the livestock industry and to public health calls for a triple-pronged attack: State and Federal control of the disease in urban pets; an attack by the Fish and Wildlife Service and similar agencies on wildlife rabies; and cooperation of the U.S. Department of Agriculture with these authorities, particularly in protecting livestock and poultry. He described Department of Agriculture activities as including epidemiological studies, aid in drawing up local regulations and in spreading control information, and vaccinating dogs on Indian reservations. He also mentioned inspecting, licensing, and testing rabies vaccines.

Among border States, Texas is hardest hit by rabies in domestic animals, said Miller, citing the 49 cases reported there in 1957 and the 74 in 1958. He gave these national figures for 1957: 654 cattle, 24 horses, 13 sheep, 16 swine, and 12 goats. In 1958, reports cover 839 cattle, 37 horses, 34 sheep, 24 swine, and 6 goats.

Rabies Control in Texas

Dr. George A. Martin, veterinary public health division of the Texas State Department of Health, attributed an increase in rabies cases in Texas in the first quarter of 1959 over the comparable 1958 period to a rise in the number of rodents and other small animals and therefore in the population of predatory animals, such as foxes, coyotes, wolves, and skunks.

In 1958, canine rabies cases totaled 236, said Martin, compared with 52 cases in the first quarter of 1959. For cats, he gave the figures of 21 and 20, respectively, and, after pointing out the difficulties in accurately gauging the extent of wildlife rabies, he estimated comparable totals of 106 and 52 for foxes; 45 and 35 for skunks; and 23 and 27 for cattle.

On the request of local authorities, Martin's unit helps set up rabies control concentrating on immunizing the dog population, controlling stray dogs, and abating the wildlife reservoir when indicated. In an analysis of several local successes and failures in control programs, he mentioned the pitfall of trying to finance control activities through high-priced dog license fees. Registration and immunization slacken as a result, he said. He recommended instead free dog registration as an initial control measure. Success in controlling rabies leans heavily on public education, he concluded.

Salmonella Still Thrives In Contemporary Setting

Modern ways of preserving and transporting food are fraught with the danger of allowing contamination with *Salmonella* organisms and of promoting rapid dissemination, in the opinion of Dr. Carl D. Heather, Ruth Keaton, H. D. Brethower, and Joseph M. Murphy, Jr., of the Texas State Health Department in Austin.

They cited the rise in number of isolates found in Texas in the last 5 years and a parallel increase in serotypes, which they attributed in part to the import of raw materials from abroad and to returning tourists. The rise in *Salmonella reading* isolates reflects a nationwide trend, they said. Among the outbreaks they reported were one with *Salmonella oranienburg*, the most commonly isolated serotype, and others with the rare *Salmonella chester* and *Salmonella blockley*.

They cautioned against too rapid incrimination of infection sources of outbreaks because some types are so common, recommending

phage typing for tracking down these sources. With all our emphasis on hygiene and our sanitation weapons, *Salmonella* still thrives, they commented.

Dog Food as Infection Source

Dog food as an important source of *Salmonella* infection in dogs is the subject of an ongoing study reported by Dr. Heather and Barbara Nobles of the department's division of laboratories. They believe that canine infection may be an important cause of human salmonellosis.

Inspired by a 1955 study by Galton and associates, Heather and Nobles sampled 14 brands of dog food from retail stores. Three were positive, one consistently so, and each of the others yielded *Salmonella* from one box out of six tested. To date, Heather and Nobles have found 400 isolates representing 18 serotypes, 12 of which were found in human stools.

Samples from each box cultured in tetrathionate broth and streaked with *Salmonella-Shigella* and brilliant green agar at 24- and 48-hour intervals yielded 9 serotypes; another trial with 7 enrichments and daily streaking for 4 days gave 15 serotypes. No salmonellae were found in formed or pressed foods.

Salmonella dublin Outbreak

Prefacing an account of a *Salmonella dublin* epidemic in southern California in the autumn of 1958, Dr. Robert D. Courter, assistant chief of the Veterinary Public Health Section, Communicable Disease Center, Public Health Service, stressed the economic and public health hazards posed by this organism.

Contrasted with its current importance elsewhere, the organism has low incidence in the United States thus far, and apparently appears only in the west.

In adult cattle, *S. dublin* may cause sporadic outbreaks and epidemics associated with other weakening conditions, especially in asymptomatic carrier animals. Infection in calves, severest among those up to about 3 months of age, is favored by overcrowding, poor nutrition and sanitation, and inadequate reaction to antigenic stimuli.

The California outbreak consisted of 11 laboratory-proved cases and 19 suspected, all traced to a certified raw milk dairy. *S. dublin* was isolated from 3 of a herd of 400 cows. Courter remarked that only repeated bacteriological tests of feces are reliable in detecting infected and carrier animals. Recovery of the organism from milk, the usual medium for man-to-man infection, tends to be from fecal rather than mammary contamination.

Courter feels that the epidemic has underlined the need for close work between authorities concerned with animal health and those dealing with human health.

Says Diarrhea Hazard Is Underestimated

Neither physicians nor the public ascribe enough importance to diarrhea among children, asserted Dr. Reynaldo A. Garza, pediatrician in the coordinated service of health and assistance of Nuevo Laredo, Tamaulipas, Mexico. In his city alone, the disease causes 50 percent of all children's deaths, he said, commenting that the causes of many cases of diarrhea remain uncertain, but that some degree of malnutrition was a factor in all these deaths.

Garza proposed, for cities like his with health centers, a unit for pediatric emergencies staffed with experts in required procedures. It should be open to all at all times.

Comparing statistically deaths among children under 5 years old in Nuevo Laredo with those in several world areas, he remarked that his city's figure of 40.2 percent of all deaths lies closer to Africa's 64.4 percent than to 8.9 for the United States. Of each 1,000 live births in Nuevo Laredo, 45.96 died from diarrhea and 6.09 from malnutrition. He also observed that the rate of 12.64 for deaths from lesions due to labor, dystocia, or premature labor should stimulate further obstetrical studies.

Garza reported a Mexican study of 12,000 coprologic specimens showing first in order of frequency the *Salmonella* species: *typhimurium*, *anaturm*, and *derby;* and next the *Shigella* species: *flexner*, *soneii*, and *boydii*. In a 1958 study in Nuevo Laredo, 32 specimens had nonpathogenic *Escherichia coli* in 11 samples and *Paracolobactrum* in 4. He announced that findings of the National Pediatrics Association of Mexico in a nationwide investigation of the

etiology of infectious diarrhea has been scheduled for publication.

Level of Hog Use Is Key To Leptospirosis Rate

The rate of human infection with leptospirosis of porcine origin hinges on the total number of hogs intensively exploited rather than on the total hog population, stated Dr. Manuel V. Ramirez of the Institute of Animal Investigations, Palo Alto, Mexico. He recommended stringent measures for eliminating the disease in Mexico, emphasizing that control should start with the hog.

Pigpens should be well drained, sunlit, and well ventilated, with cement floors, abundant running water, and antirodent equipment. Measures should include periodic disinfection, isolation of newly arrived hogs until shown free of the disease, periodic testing, immunization, and treatment of carriers with antibiotics.

Discussing serotypes pathogenic to man, Ramirez observed that rodents are primary reservoirs for most, and that transmission to hogs is through contaminated food, water, or soil. Among the characteristics of leptospirae are survival for more than 10 days in water with little chlorine and longer periods in alkaline soils, death in less than 10 minutes from radioactive ultraviolet rays, less than 10 seconds in 70° C. of dry heat.

Leptospira in the hog's blood, said Ramirez, favors infection of slaughterhouse workers; in an Australian study, 76 percent of such workers showed antibodies to two serotypes. In hog-producing Iowa, a study showed 16.4 percent of veterinarians had antibodies, and in Missouri, 5.2 percent.

Urges Tightened Laws For TB Control

The weak link in tuberculosis control along the border has been in applying legal restraint on recalcitrant patients, according to Jack C. Postlewaite, director of the tuberculosis division, El Paso City-County Health Department, Tex. He commended local physicians, however, for almost unanimous cooperation in reporting tuberculosis cases during 1958.

Postlewaite observed that El Paso is exposed to the disease from both human carriers—the so-called cured and arrested cases from nearby sanatoriums—and bovine, from Mexico, where it is endemic.

Postlewaite stated that deaths from tuberculosis have declined more rapidly than the case rate in recent years. This is explained both by improvements in treatment and in casefinding and reporting. Approximately 300 patients were in the tuberculosis hospital in 1952 compared with about 700 in 1958. This rise he attributed to intensive study of a large population of potential patients. When, for example, a meningitis prophylaxis study was conducted with Federal funds among 189 patients, a concurrent rise of about 300 percent was reported in the disease's incidence among school children under age 15. Other special studies were on 397 tuberculosis contacts, with Public Health Service aid, patch tests on 10,421 children, and another using X-ray mobile units which reached 6,505 persons in the county in 1958.

Postlewaite pointed out that in 1948 hospital tuberculosis cases were evenly distributed among minimal, moderately advanced, and far advanced. Since 1952 moderately and far-advanced cases have decreased, and minimal have increased 300 percent since 1955.

For developing tuberculosis control and therapy, Postlewaite's recommendations included:

- Local ordinances requiring X-ray surveys of food handlers; enforced isolation of positive pulmonary cases; appropriate legal action to hospitalize and treat recalcitrant active cases.
- Frequent public health nurse visits to homes of suspected persons; good contact studies by X-ray, skin tests, and gastric or sputum culture studies and active tuberculin skin tests of school children under age 15, and X-ray screening of older persons.
- Prohibiting tuberculosis suspects or persons with so-called arrested or cured disease from exertion until three sputum and three gastric cultures are reported negative.
- Skin tests (Mantoux) of all patients attending the well-baby clinic, at yearly or preferably 6-month intervals.
- Required regular examination, by the physician and tuberculosis control nurse, of a case

registry for control and treatment of all cases observed during the year.

• A pulmonary tuberculosis unit for isolation and therapy in a general hospital operated by the city and county, which may be used for temporary isolation and detention before transfer to the State hospital.

• A preventorium for isolation of contact children and a chronic disease hospital for patients with negative sputums but with crippling pulmonary or cardiac conditions secondary to the disease.

Screening for tuberculosis at the well-baby clinic in El Paso was described by Elizabeth Marcus, tuberculosis coordinating nurse in the El Paso City-County Health Department.

In addition, said Marcus, family members of patients are asked to the clinic for X-rays or skin tests. From the well-baby clinic following this screening routine, she announced, nine children were put under preventive treatment in 1958.

Sees Isoniazid Prophylaxis Only for High Risk Cases

Because of today's limited risk of tuberculous infection, the practicality of using isoniazid as a prophylactic among tuberculin negatives generally was questioned by Dr. Francis J. Murray, special consultant in the tuberculosis program of the Public Health Service. Its use could be foreseen where exposure is great and unavoidable, however. He mentioned large-scale studies of naval recruits indicating less than 6 percent tuberculin positives, a drop in infection prevalence to about two-thirds of the rate among them in 1950.

Murray's comments followed his review of a series of controlled studies conducted by the Public Health Service.

A longitudinal study of the chemoprophylaxis potential of isoniazid on 2,750 children with asymptomatic primary tuberculosis operated in 33 pediatric clinics in the United States, Mexico City, San Juan, P.R., and Toronto, Ontario, beginning in 1955. Administrators carefully assigned children to groups receiving isoniazid or comparable groups taking placebo, in a "double-blind" manner: neither subject nor investigator knew which were the controls. Daily doses of isoniazid were from 4 to 6 mg. per kilogram of body weight. About 60 percent of each group were less than 4 years old, 10 percent less than a year, and the rest ranged up to 16.

Results of clinical, laboratory, and X-ray examinations made monthly the first year and quarterly the second were evaluated by a board of six investigators selected by all such participating workers. The first year, 2 definite complications showed in the isoniazid group compared with 27 among the controls. In the second year, among the 750 taking isoniazid and 740 taking placebo, the figures were 3 and 6.

A subsequent study begun in 1957 has covered about 28,000 household contacts in cooperation with 37 health departments in the United States and in Juarez, in 16 centers in Puerto Rico, and 27 villages in Alaska. About 3,500 of these contacts are in border States.

Members of households with new cases are X-rayed and tuberculin tested. The contact population is divided at random into matched groups by household size, one to receive isoniazid and the other, placebo. The study is also double blind to eliminate bias in evaluating findings.

Murray anticipates major findings only from longer observation. Rather than reexamination at the year's end, the study checks tuberculosis incidence and deaths in contacts' localities against the roster of participants and will periodically locate and thereby determine participants' general health status, possibly through commercial credit facilities.

In mental institutions, other studies covered 5,521 participants in 25 Wisconsin county hospitals and 8,360 patients in Milledgeville State Hospital. In Michigan, 3,800 are in an ongoing study, as are others in Massachusetts.

Murray observed that about 70 percent of the 85,000 new tuberculosis cases each year in this country may have been tuberculin positives before. Evidently, the disease is most often endogenous, he stated, citing in support a Danish study also indicating a higher risk for tuberculin positives than for negatives. This possibility and the constantly decreasing risk to tuberculin negatives make the prophylaxis studies especially relevant to tuberculin positive

subjects, he feels. If the studies' tuberculin positives are at decreased risk after year-long isoniazid intake, the drug will benefit markedly those now infected and indirectly cut the infection risk among those not infected, concluded Murray.

Few Bracero Health Views Changed by Work in U.S.

Health attitudes and practices of contract farm laborers from Mexico, or braceros, are not significantly changed by work in the United States, according to a survey of 1,100 of such workers reported by Henry P. Anderson, research public health sociologist, School of Public Health, University of California, Berkeley.

Designed to yield demographic, theory-oriented, and program-oriented data for public health workers serving braceros, the project was financed mainly by a Public Health Service grant. Interviewing was conducted at the El Centro, Calif., reception center, which, Anderson pointed out, draws mainly from one of several areas supplying these workers. The control group was made up of braceros newly entering this country.

Findings showed that the typical bracero:

- Whether single or married, had about six dependents and came from a small town or village in which he had lived all his life.
- Tended to use medical services more for scientifically recognized diseases than for folk illnesses.
- In selecting type of therapy, was influenced by economic considerations.
- Tended to be unclear about disease prevention and preventive activities of health agencies.
- Knew about origins of venereal disease but not tuberculosis, which causes the greatest number of bracero rejections.
- In choosing a physician, valued efficiency and ease of communication over personal qualities.

Pond Receives Winslow Award

M. Allen Pond, Assistant Surgeon General of the Public Health Service since 1958, has been presented with the C.–E. A. Winslow Award by the Connecticut Public Health Association.

The award, given annually to a Connecticut individual, group, or organization for an outstanding contribution in public health, is based on the ideals set by the late Charles-Edward Amory Winslow, bacteriologist, health educator, historian, pioneer in public health, author, and teacher.

Mr. Pond joined the staff of the Secretary of Health, Education, and Welfare in 1953, after serving 2 years as coordinator of community facilities services in the office of the Surgeon General. He has been a commissioned officer of the Public Health Service since 1942, except during 1946–48 when he was assistant professor of public health at Yale University. In 1949 he was appointed chief of the Division of Engineering Resources.

Mr. Pond took a bachelor of science degree in 1935, and a master of public health degree the next year, from Yale University, where he continued on as a teacher of public health until 1942. He has been an officer in the American Public Health Association, the Yale Alumni in Public Health, and Loomis School Alumni Association.

A prolific author, he has served on the boards of *Public Health Reports*, the *Sanitarian*, and of official and private organizations connected with community building and planning.

Current Concepts on Control Of Diarrheal Disease

MELVIN H. GOODWIN, JR., PH.D.

THE URGENCY of meeting the public health challenge presented by diarrheal disease in States on both sides of the Mexican border was emphasized in a report prepared at the 1958 meeting of the U.S.-Mexico Border Public Health Association. That report enumerated available control measures and outlined the necessity for more precise delineation of problems and for development of more precise procedures against specific pathogens. The present paper is related especially to one of the points covered in the report: What assumptions regarding etiology and epidemiology allow us to proceed to a control program where laboratory facilities are missing? Some of the implications to control are suggested by results available thus far from studies on the etiology of diarrheal diseases at Phoenix, Ariz.

Recognized Pathogens

The work at Phoenix was designed to provide information on the current association of recognized pathogenic agents with diarrheal diseases. Previous studies in the southwest indicated the prominence of shigellae in the etiology of enteric infections. Investigations conducted by Hardy and Watt (*1*) from 1936 to 1938 indicated that these pathogens were isolated from 76 percent of the severe cases and 58 percent of the milder cases for all age groups. In recent years, cursory observations and a few studies specifically designed to determine what etiological agents are currently responsible for diarrhea suggested that pathogens other than *Shigella* probably were of relatively more importance as causes of illness and death (*2*).

Infant deaths attributable to diarrheal disease in the United States receded from about 12,500 in 1941 to approximately 5,000 in 1956 (see chart). In the last few years, however, the rate of decline has diminished and the annual incidence appears to have stabilized at about 5,000 deaths. If this indicates that the maximum effectiveness of available control measures has been realized, further reductions in diarrheal diseases may depend upon development of more effective control methods or upon wider and more intensive application of existing measures. Prerequisite to either course is a redefinition of the problem based on knowledge of etiological agents currently responsible for diarrhea and of the appropriateness of available control measures for areas where problems are now most acute. Consequently, the first investigations at Phoenix were designed to determine the current association between recognized pathogens and diarrheal symptoms.

Results from initial studies, which were reported elsewhere in detail (*3*), may be summarized briefly. Intensive examinations for pathogenic enteric bacteria were made on specimens from 630 persons with symptoms of acute diarrhea for which treatment was sought. Approximately 67 percent of these persons were less than 1 year of age. Recognized bacterial pathogens were isolated by a single examination from 57 percent of the cases. *Shigella* organisms were recovered from 26 percent, enteropathogenic *Escherichia coli* from 31 percent, and *Salmonella* from 7 percent. About 90 percent of all enteropathogenic *E. coli* and 40 percent of the *Shigella* recovered were from infants less than 1 year old. The cases from which etiological agents were not recovered showed no characteristic distribution with respect to age of patient or month of occurrence.

The need for further research is indicated by the fact that no recognized pathogens were detected in approximately half of the acute cases studied. In addition to searching for unrecognized pathogens, attention must be given also to the possibility of etiology unrelated to infectious agents. Not only were the

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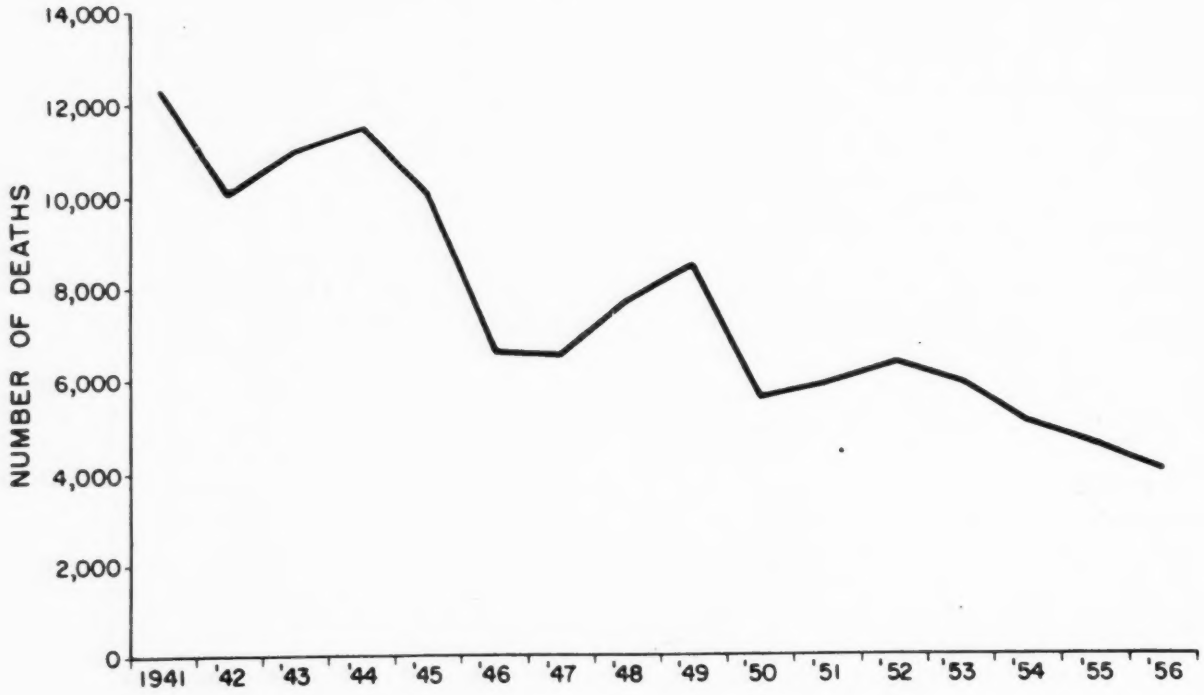
Dr. Goodwin, who is chief of the Phoenix Field Station Section of the Communicable Disease Center, Public Health Service, summarizes in this paper material he presented to the U.S.-Mexico Border Public Health Association meeting on March 31, 1959, in Brownsville, Tex.

A Spanish version in summary form appears in the February 1960 Boletin of the Pan American Sanitary Bureau.

Number of diarrheal deaths among infants under 2 years of age, in the United States, from 1941 to 1956



majority of acute cases in the Phoenix studies in infants less than a year old, but the highest mortality from diarrhea characteristically occurred among infants during the first few months of life. Data available do not indicate whether or not the inherent virulence of specific pathogens associated with diarrhea of these young children is responsible for the high mortality or whether unfavorable prognoses result from other circumstances, for example, the rapid dehydration, malnutrition, or synergistic effect of other organisms. Furthermore, accumulation of additional information on the epidemiology of certain pathogens, *E. coli*, for example, is necessary to enable development of specific control measures.

Control Measures

Obviously, continuing investigations and development of more effective control measures are necessary to achieve the ultimate goal of control and eradication of diarrheal diseases. Public health workers recognize, however, that much can be done in the meantime to meet current problems that should not wait until procedures are devised that assure attainment of the more remote objectives. Although its relative prominence has apparently diminished, *Shigella* still seems to be the dominant etiological agent of summer diarrhea in the areas investigated. Traditional control measures, such as provision of water supply within individual homes, general environmental sanitation, promotion of breast feeding, health education, and maternal and child care, are of proved value in reducing these infections. No new techniques are proposed on the basis of the work outlined here, but different methods for application of existing procedures are suggested which may enhance their effectiveness.

It should be remembered that as the amount of environmental contamination decreases, the relative importance of transmission by personal contacts apparently becomes more significant. While a great deal of further work is necessary to improve environmental conditions and reduce further the possibility of spread of diarrhea through inadequate excreta disposal and limited water supplies, it will be well to keep in mind that different techniques, many that are simple and easy to apply, may effec-

Table 1. Frequency distribution by families of diarrhcal episodes reported and of Shigella isolated from residents of Sacaton, Ariz., May 1954 through December 1958

Number of episodes	Number of families	Cumulative number		Positive cultures for *Shigella*	Number of families	Cumulative number	
		Episodes	Families			Positive cultures	Families
50	1	50	1	20	1	20	1
41	1	91	2	17	2	54	3
36–37	2	164	4	15	1	69	4
				14	1	83	5
26–29	3	245	7	11	1	94	6
21–25	4	341	11	9	2	112	8
16–20	12	548	23	8	3	136	11
11–15	10	676	33	7	3	157	14
6–10	20	834	53	6	6	193	20
4–5	11	883	64	5	7	228	27
3	10	913	74	4	4	244	31
2	12	937	86	3	9	271	40
1	21	956	107	2	11	293	51
0	2		109	1	19	312	70
				0	39		109

tively decrease the amount of human contact with infectious material.

As the incidence of diarrhea is reduced, homogenous specific foci, which are evident even in areas of high incidence, become increasingly apparent. In any situation a small number of families in the community usually will be responsible for the majority of diarrheal diseases in a particular area. This is illustrated by data from Sacaton and Guadalupe, Ariz., where observations were made from May 1954 through December 1958 and from May 1954 through September 1957, respectively. The prevalence of *Shigella* among children from 1 to 5 years of age was determined by monthly examination of fecal specimens collected by rectal swab. Data on morbidity experience of the entire population were obtained by monthly interrogation.

Tables 1 and 2 show the frequency with which episodes of diarrhea were reported and the rate of *Shigella* positive cultures in families of the communities. In Sacaton about 57 percent of the cases of diarrhea reported were from only 21 percent of the families. Approximately 62 percent of *Shigella* positive cultures were obtained from 18 percent of the families.

Table 2. Frequency distribution by families of diarrheal episodes reported and of Shigella isolated from residents of Guadalupe, Ariz., May 1954 through September 1957

Number of episodes	Number of families	Cumulative number		Number of positive cultures	Number of families	Cumulative number	
		Episodes	Families			Positive cultures	Families
44	1	44	1	22	1	22	1
33	1	77	2	10	1	32	2
29–31	2	137	4	8	2	48	4
21–25	12	412	16	6	3	66	7
16–20	8	555	24	5	6	96	13
11–15	21	820	45	4	12	144	25
6–10	55	1, 256	100	3	25	219	50
5	18	1, 346	118	2	33	285	83
4	25	1, 446	143	1	58	343	141
3	26	1, 524	169	0	155		296
2	42	1, 608	211				
1	78	1, 686	289				
0	7		296				

Similar patterns were apparent in Guadalupe. Here about 15 percent of the families reported approximately half of the diarrhea and 17 percent of the families provided 64 percent of the positive cultures. The vast majority of families had only a few episodes during the period of study. Obviously, the greatest effect of a community control program could be realized by working with the families having high rates. Programs of environmental sanitation particularly, and to some extent efforts to improve personal hygiene and provide health education, have been directed on a broad base to include all of the population. The same or less effort directed toward the relatively few families or premises that are infected most frequently, and consequently which probably contributed most of the infections, would probably achieve greater reduction in prevalence.

Families responsible for high rates can usually be singled out by public health and social workers after acquiring a superficial knowledge of the community. Further consideration of means for detecting the high rate in families may lead to development of more objective techniques.

The basic concept to emphasize is that regardless of the nature of control measures, it is usually possible to be selective in the places of their application. The magnitude of the problem may often be discouraging when working with every premise or family in a community, but if the number can be reduced by a factor of 50 to 75 percent, the possibilities of achievement appear more realistic.

Conclusion

Studies on etiology of diarrheal diseases in the Phoenix area have disclosed where further investigations are needed. The importance of additional information on epidemiology and etiology is recognized, but the need is not yet acute. Of more immediate concern, the results reemphasize that more intensive application of available techniques should further reduce morbidity and mortality attributed to diarrheal disease.

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WHAT DO THEY DO IN TOLEDO?

LATE MARKET REPORT: HEAVY DEMAND FOR WORD OF EXEMPLARY OR SUCCESSFUL PROCEDURES IN HEALTH DEPARTMENTS STOP CONTRIBUTIONS OF TWO HUNDRED TO TWO THOUSAND WORDS ACCEPTABLE STOP ACTION PICTURES WELCOMED STOP ADDRESS EDITOR PUBLIC HEALTH REPORTS USDHEW WASHINGTON 25 DC

Translated Readings

The following items are selected from foreign scientific literature, principally Russian, translated by the Central Intelligence Agency, and distributed by the Office of Technical Services, U.S. Department of Commerce, in a series known as *Scientific Information Reports*. Further details may be obtained from the Office of Technical Services by specifying the volume and item given in parentheses in paragraphs below: the first number identifies the volume; the second, the item.

Preservation of Coxiella burnetii

To determine possible time limits for persistence of secondary reservoirs of Q fever, V. F. Ignatovich, Moscow epidemiologist, studied factors affecting survival of *Coxiella burnetii* in cultures on wool, sand, mud, and sawdust under different conditions of temperature and humidity. Some cultures were viable after 6 months (*30, 75*).

Hungarian Pharmacy

A review of research in the Hungarian Pharmaceutical Institute, by Gyula Horvath, Budapest, has been published in *Magyar kemkusok lapja* (*30, 87*).

Charges on Bacteria

Using an apparatus of his own design, V. V. Vlodavets, Moscow, following suggestions of Prof. S. S. Mechmenskiy, was able to detect and distinguish between electrical charges on micro-organisms in air (*29, 102*).

Tolerance of HCl

A concentration of no more than 0.05 mg. of HC–l aerosols per cubic meter of air is recommended by Ye. V. Yelfimova, Moscow, as a result of investigations which found a threshold of tolerance for the olfactory senses at 0.1–0.2 mg.; for optic chronaxy, 0.6 mg.; for vascular reactions, 0.5 mg.; and for respiration, 0.1–0.2 mg. (*23, 101*).

Biochemical Adaptation

The ability of the human organism to adapt itself to varying environmental, physiological, and pathological conditions is discussed with respect to biochemical processes by Prof. M. Merszhinskiy, Minsk (*22, 81*).

Radiobiology Review

Work in radiobiology between 1952 and 1955 is reviewed in a book edited by Prof. A. M. Kuzin. The title is "Itogi nauki," published in Moscow in 1957. It is proposed to publish such reviews every 2 or 3 years (*18, 114*).

Genetic sequelae of exposure of man to ionizing radiations are reviewed by N. I. Shapiro, Moscow (*31, 85*).

Vibration Sickness

Effects caused by localized high-frequency vibrations are the subject of papers by A. S. Mel'kumova (*31, 73*) and N. N. Pushkina and L. B. Yushkevich. (*31, 74*). The latter paper reports a mild leukocytosis and a tendency to hypoglycemia.

Radioactive Environment

Arrangements for protection against radiation on the nuclear-powered icebreaker, *Lenin*, are detailed by A. I. Burnazyan, I. D. Kamyshenko, and Yu. G. Nefedov, (*26, 110*).

Cancer Research in China

A review of cancer investigations by Chinese scientists has been published by Hu Chinghsian, Peiping (*25, 84*).

Tetanus Therapy

A new method of treating tetanus victims with a curare-like preparation, diplacine, has been developed by Prof. V. N. Shamov of the

Kirov Military Medical Academy, and applied by K. M. Loban, Moscow, and K. A. Nurishchenko, Leningrad, with success. As described by K. Proshunin, treatment in one case consisted of intravenous administration of 60–70 mg. of diplacine to a woman patient, once or twice a day for 10 days. Artificial respiration was provided when necessary. After dosage, opisthotonus disappeared and pain and spasms subsided (*24, 91*).

Ear Surgery

The gift of hearing to nine children born deaf is reported to result from surgical installation of an artifical eardrum by Professor Malamush of the Dzhershinskiy Children's Clinic, Moscow (*24, 117*).

Carcinogens in Cured Meat?

Certain smoke-curing processes in the meat industry in Leningrad introduced materials which, after ingestion, may facilitate cancer formation, according to A. Novikov, director of the Moscow Oncological Institute, quoted in *Magyar nemzet* of Budapest. On the basis of recommendations by Leningrad investigators, he said, the smoke-curing processes were revised (*28, 97*).

Air Filtration

FP 5 and number 3 membrane filters for removing micro-organisms from the air were compared by Ye. Yu. Zuykova, Moscow. While both were effective, it was concluded that the FP filter is better for rapid filtration of large volumes of air, as it has less resistance to air currents and is less fragile than the membrane filter (*28, 102*).

Biological Gloves

Protecting skin against solvents and synthetic tars, workers at the Gor'kiy factory, Krasnoye Sormovo, coat their hands with a paste made of 300 grams of casein gum extra, 10 grams of 25 percent ammonia, 300 grams of glycerine, 850 grams of alcohol, and 850 grams of water. The casein is dissolved in half the water, and ammonia in the remaining water, glycerine, and alcohol are added in that order. The paste forms a film on the hands. It washes off with warm water and soap (*28, 104*).

Brucellosis Vaccine

Tests of a live vaccine against brucellosis are reported from Kazakhstan and Alma-Ata (*27, 70*).

Decontamination of Leather

A 1 percent salt solution of chloramine in 30 minutes decontaminates hides infected with *Brucella*, without impairing the leather, reports K. Ye. Yedygenov, Alma-Ata (*27, 85*).

Effects of Exercise

Exertion's effects on bone and muscle were analyzed in a systematic study carried on for 10 years by M. G. Prives, who holds the chair of normal anatomy in the Leningrad medical institute named for Pavlov. Prolonged exertion produces marked changes, especially in the diaphragm. Phosphorus is deposited in the bones that carry the greater physical load, the substantia compacta thicken, and the bone marrow cavities are reduced. If a person changes to an occupation that requires less exertion, the symptoms of hypertrophy decline. The measurements were conducted with the aid of X-ray and radioactive trace elements (*27, 82*).

Data on Poisons

Toxicological data on certain organophosphorus compounds in relation to their chemical structure have been published by Yu. S. Kagan (*26, 82*).

Public Health Progress

A book on public health in the U.S.S.R. and achievements of Soviet medicine is reviewed, apparently by CIA, with an effort to summarize the contents of 124 pages. The authors are Nikolay Ivanovich Graschenkov and Yuriy Pavlovich Lisitsyn. The review says: "It can be gathered from the text that technical changes . . . parallel the development of national economy." The table of contents gives 14 pages to conditions in Czarist times, 25 pages to the October Revolution and its plans for protecting the health of workers, 10 pages to prophylaxis, 14 to an attack on infections, 4 to the prospect of eradicating tuberculosis, 13 to conditioned reflexes, 11 to cardiovascular diseases, 5 to cancer, 3 to blood banks,

4 to new drugs, and 5 to international medical relations. There is no chapter on environmental health services (*22*, *86*).

Soviet authorities have scheduled graduation of 13,700 sanitary physicians, specializing in hygiene and sanitation, for the 5-year period ending 1960. In the previous 5 years, 8,900 were graduated. In the period ending 1965, the number to be graduated will exceed 10,000. It is asserted, "This will satisfy the needs of the Soviet population as far as sanitary epidemic control is concerned." The physicians are trained in 19 sanitary hygiene faculties of medical universities (*15*, *43*).

Public health progress in the Turkmen S.S.R. is the subject of a book by M. G. Berdyklychev, reviewed by P. P. Radkin. He notes that only 20 years ago malaria and trachoma constituted 40 percent of the total incidence of disease in the Republic, whereas these afflictions today are not appreciable. Pappataci fever and typhus have been eradicated (*19*, *108*).

A report on developments in Polish health in the last 15 years has been published by Dr. B. Kozusnik, deputy minister of health, Polish People's Republic (*29*, *118*).

Pasteurella tularensis Strains

Differences in tularemia pathogen strains were analyzed by N. F. Olsuf-yev, O. S. Yemel'yanova, and T. N. Dunayeva, Moscow. The virulent Schu strain, acquired from American investigators in California and Kansas, was compared with virulent strain 503, isolated from *Dermacentor pictus Herm* ticks by N. G. Olsuf'yev in 1949 (*28*, *92*).

Tickborne Encephalitis Virus

Tickborne encephalitis virus was preserved in cow's milk at refrigerator temperatures. In sour cream and butter, the virus was preserved for 2 months, by M. Gresikova Kohutova, Czechoslovakia (*29*, *103*).

Radiotherapy

A review of medical applications of radionuclides in the U.S.S.R. is summarized by Prof. A. Kozlova, Moscow (*29*, *111*).

Antihemorrhagic Drug

Poison from the guersa snake was used to create a drug 10 times as effective in halting bleeding as that derived from the Indian viper, doloya. The drug was developed at the Stalinabad Medical Institute (*29*, *115*).

Carbon 14 in Tobacco Tar

After burning 101 cigarettes, J. R. Chojnowski and A. Dorabialska, in a study conducted in Poland, found that 1 gram of carbon from tobacco tar emitted 154 pulses of radiation a minute. In contrast, carbon from carbon dioxide emitted 95 pulses, and that from carbon monoxide emitted only 62 (*20*, *71*).

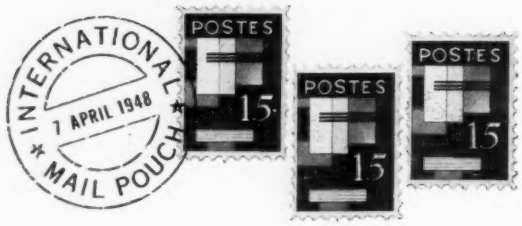
Mental Therapy

Properties of a variety of drugs used in psychotherapy are reviewed by Karl Libering, Yugoslavia (*20*, *90*).

Prospects for development of Soviet psychiatry in the next 7 years are described by V. A. Gilyarovskiy, Moscow (*19*, *106*).

Sonic Aerosols

Use of ultrasonic atomizers in the prophylaxis and therapy of diseases requiring aerosol treatment is discussed by A. P. Livenson, Moscow. The bibliography contains seven titles (*19*, *82*).



Fifteen Cents

Nearly 6 million people in Ceylon are protected against malaria at an annual cost of 15 cents per capita. The 1958 report of the antimalaria campaign lists 114 vigilance and subvigilance units and 38 mobile spray units at work. A total of 624 persons are engaged in eradication activities.

Only 27 persons were reported to have died from the disease in 1958, and positive blood smears from fever cases decreased from 6.4 percent of 105,957 smears in 1957 to 1.6 percent of 63,866 smears in 1958.

During the year U.S. Operations Mission in Ceylon contributed supplies, materials, and equipment including 34 jeeps, 7 carriers, and a station wagon to the antimalaria campaign. Dr. L. F. Gunaratna, who joined the campaign in 1946, superintended eradication activities from May 1955 until his death in September 1958. Dr. T. Visvalingham succeeded him as superintendent.

—TROIS E. JOHNSON, M.D., *former chief public health adviser, U.S. Operations Mission, Ceylon.*

Pilot Study in Laos

Last June we started a pilot study to determine the best way to distribute pyrimethamine, a malaria suppressant, to the primitive groups in Laos. Supplies of the drug were given to three voluntary agencies.

The MEDICO clinic at Muong Sing is giving tablets to several hundred persons, including an army detachment nearby. The staff has also sprayed some 70 houses, using the DDT and sprayers supplied by our mission.

The nurse on the International Voluntary Service team at Phon Savanh is giving the tablets to more than 300 people weekly. She reported that headmen from remote villages are coming to ask for the drug.

The eight clinics run by Operation Brotherhood are supplying pyrimethamine to some 6,000 persons for a 6-month period. Also, the physician for USOM personnel is giving tablets to 150 villagers and a member of the agriculture department asked for a supply for the staff of the USOM pig farm.

Although the pilot study includes less than 10,000, we expect to gain some valuable information on how to sell malaria prophylaxis and can evolve a workable system for distribution on a larger scale in the future.

Before the pilot study started, antimalarial activities in Laos were strictly a Government function with USOM advice and funding. Now other agencies are eager to participate.

—MANLY B. DONALDSON, M.D., *chief, public health division, and* MAYNARD S. JOHNSON, PH.D., *malariologist, U.S. Operations Mission, Laos.*

Resettling Workers

Displaced miners and factory workers from Altiplano mining centers in Bolivia will be settled on farmlands in the tropical highlands of Yungas, 170 kilometers from La Paz. Servicio Cooperativo Interamericano de Salud Pública is cooperating by planning, constructing, equipping, and staffing hospital-health centers in Caranavi, Circuata, and Coroico, which will serve about 25,000 people within 5 years.

—MARCUS P. QUINN, *acting director, Servicio Cooperativo Interamericano de Salud Pública, Bolivia.*

Rehabilitation Teams

The Government of Colombia is sending rehabilitation teams to bolster "all areas of human life" into regions where severe economic and social problems remain as the result of years of political and civil violence.

Following visits to these areas by survey teams and arbiters, the Government made plans to recruit rehabilitation teams. Each will have a physician, nurse, civil engineer, two agricultural extension workers, and a home demonstration agent.

We were asked to help train the teams and are giving them 9 hours of instruction in health education, 1 each in nutrition and industrial health, 2 each in sanitation and public health nursing, and 3 in community organization.

—E. E. MINTY, *acting director, public health division, U.S. Operations Mission, Colombia.*

Federal Publications

A Composite Method for Estimating Postcensal Population of Small Areas by Age, Sex, and Color. *Vital Statistics—Special Reports; Selected Studies; vol. 47, No. 6, pages 161–185; Aug. 24, 1959; by Donald J. Bogue and Beverly Duncan.*

A comparatively simple, inexpensive technique for preparing specific current local-area estimates sufficiently reliable for most planning and policymaking uses and for studies of population trends is outlined.

The rationale of the method, procedures for making estimates, accuracy of estimates, possible refinements, and indirect estimates are discussed.

The text is supported by nine tables and a line graph.

Maternal Disorders Related to Fetal Stress, Perinatal Death, and Congenital Defects. Selected references, 1952–58. *PHS Publication No. 669 (Public Health Bibliography Series No. 25); 1959; compiled by Elizabeth Koenig; 33 pages; 15 cents.*

Four hundred and thirteen references to English language studies have been compiled for medical and public health workers interested in the prevention of reproductive wastage.

Infectious diseases are emphasized. Studies on metabolic, neurological, collagen, and blood disorders, drug effects, and statistical data are included.

Municipal and Industrial Waste Facilities, 1957 Inventory. A cooperative State-Federal report. *PHS Publication No. 622; 1959; vol. 1, 65 cents; vol. 2, $1.75; vol. 3, $1; vol. 4, $1; vol. 5, $1.75; vol. 6, $1.25; vol. 7, $1; vol. 8, 60 cents; vol. 9, $1.25; the set, $10.25.*

Data of significance in water pollution control programs and waste treatment facilities are segregated into nine volumes according to Department of Health, Education, and Welfare regions. Material in each volume is arranged by State and alphabetically by community. The volume numbers correspond with the region numbers.

Highlights of Research Progress in Allergy and Infectious Diseases, 1958. *PHS Publication No. 694; 1959; 68 pages; 30 cents.*

Significant research accomplishments in intramural and grant-supported projects of the National Institute of Allergy and Infectious Diseases are described briefly. Subject areas include allergy-immunology, virus diseases, cell biology, and parasitic diseases.

Discussions of staphylococcal and cystic fibrosis research, the Middle America Research Unit in Panama, the respiratory virus study in Antarctica, and various special studies are also presented.

Public Health Service Grants and Awards by the National Institutes of Health, Fiscal Year 1959. Health research facilities construction and research grants. *PHS Publication No. 701, part 1; 1959; 318 pages; $1.*

Grants for health research facilities and for research projects are listed separately by State and institution. A summary table of research grant support by the individual institutes and the Division of General Medical Sciences shows the distribution of grants by State and grantee institutions. The total number and amount of grants to each institution and each State are included in the directory of individual research investigators.

Film Reference Guide for Medicine and Allied Sciences. *PHS Publication No. 487; 1959; 192 pages; $1.*

Approximately 2,000 up-to-date films and filmstrips produced and in use by agency members of the Interdepartmental Committee on Medical Training Aids are listed. Also included are productions of civilian agencies or individuals useful to member agencies.

A brief description under each title includes an abstract of the film's content. An alphabetical list of distributors and instructions for borrowing films are provided.

Dental Care in a Group Purchase Plan. A survey of attitudes and utilization at the St. Louis Labor Health Institute. *PHS Publication No. 684; 1959; 68 pages.*

Dental treatment sought from a group clinic by Teamsters' Union members and their families is analyzed in relation to family size, race, income, educational levels, and attitudes toward dental care. The need for dental health education is emphasized.

Poultry Hygiene. Examination and evaluation of poultry and poultry products. *PHS Publication No. 683, part 1 (FDA Technical Bulletin No. 2); 1959; 55 pages; 40 cents.*

Procedures for antemortem and postmortem inspection of poultry are recommended to officials conducting poultry hygiene programs and as a guide for training lay inspectors and plant personnel.

Included are discussions of 33 diseases and undesirable conditions, significance of specific findings, and disposition of carcasses.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.

The Public Health Service does not supply publications other than its own.

ECHOES from Public Health Reports

AN EPIDEMIOLOGICAL STUDY OF ENDEMIC TYPHUS (BRILL'S DISEASE) IN THE SOUTHEASTERN UNITED STATES

WITH SPECIAL REFERENCE TO ITS MODE OF TRANSMISSION

By KENNETH F. MAXCY, Passed Assistant Surgeon, United States Public Health Service

At the beginning of this century it was generally held that typhus fever had disappeared from the United States except for an occasional case imported from Europe or from Mexico.[1]

In 1910 Dr Nathan E. Brill (1898, 1910, 1911), of New York, called attention to a typhuslike disease occurring endemically in that city. He hesitated to identify it as typhus because of its generally milder course and its occurrence under circumstances different from those usually associated with that disease. He accordingly believed that he was dealing with a new clinical entity, "an infectious disease of unknown etiology." Cases of this type have since been known in the United States as Brill's disease.

In 1912 Anderson and Goldberger, who had previously reported on the experimental transmission of Mexican typhus ("tabardillo") to monkeys, were similarly successful in the inoculation of a Rhesus monkey with blood from a case of Brill's disease in New York. They found that, as in "tabardillo," one infection rendered monkeys immune to subsequent inoculations of the same passage virus. Furthermore, monkeys previously infected with Mexican typhus were thereafter found immune to Brill's disease, and vice versa. From these observations they concluded that Brill's disease was, in fact, identical with typhus fever, and this conclusion seems to have been quite promptly and generally accepted.

[1] August Hirsch, in his "Geographical and Historical Pathology" (Pub. by the New Sydenham Society, London, 1883), states that:

The proper era of typhus for the United States and Canada begins with the period when immigration from Ireland had set in on a large scale. We thus explain the fact that the ports on the east coast of North America have been the headquarters of the disease, and that the largest contingent of the sick has been supplied by the immigrants themselves, or their countrymen with whom they had come in contact. On the other hand, it is a noteworthy fact that the most careful search among the plentiful epidemiologic records in the literature of the United States fails to discover a single statement as to the occurrence of typhus in the Mississippi Valley or in the Western States, so that the greater part of the continent appears

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A systematic and thorough account by Dr. Kenneth F. Maxcy of a study of Brill's disease in southern Alabama and Savannah, Ga., confirms its endemic character and points out differences in epidemiological characteristics from those of typhus in the "Old World."

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